

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This Chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter.

Changes made between the Draft and Final EIS _____

The following changes were made between the Draft and Final EIS. This listing does not include corrections, explanations, or edits to grammar and spelling. Some of changes resulted from comments made to the DEIS.

1. Noxious weed field surveys were completed during the summer of 2003. A summary of the information is now included in the Affected Environment section for noxious weeds and analysis impact possible impacts of the activities assessed in Chapter 3 of the EIS. A map and data table for each weed site is in the project file.
2. The effects of Alternative 5 were included in all the resource sections in Chapter 3 of the FEIS.
The economic analysis in Chapter 3 of the FEIS was modified to reflect changes in lumber values, reduction of deterioration of dead timber, and correct an error in the analysis.
3. A low densely roaded areas analysis (Roads/Access section) was completed for the project area. A map of the findings is included in the project files and summary in the FEIS, Chapter 3, Roads. The maps can be found in the project file.
4. The soils section of the FEIS in Chapter 3 provides additional analysis of soils impacts of harvest on biotic/nutrients; impacts from harvest; food web, and soil impacts of helicopter yarding.
5. The wildlife affected environment and environmental effects sections include additional analysis and information n Chapter 3 of the FEIS. Included updates are the MIS Primary Cavity Excavator snag analysis added additional information and effects. Other changes included additional effects discussion on landbirds and neotropical birds; . the effects to Goshawks, more lynx information; MIS survey information, effects on Pine martin , Bald eagle effects calls were reviewed, and big game winter range road densities were calculated.
6. The sensitive plant section of Chapter 3 of the FEIS was updated to reflect new field survey information gathered in the spring of 2003.
7. The effects to Columbia spotted frogs, Malheur mottled sculpins, and redband trout were reanalyzed and changes were made to the effects determinations.
8. Additional analysis was included relating to the fire threat if harvest does not occur.

9. An analysis of unroaded areas was added in response to a comment on the DEIS from the Oregon Natural Resource Council.
10. The stream temperature information was reviewed and additional information was included in the aquatics section of Chapter 3.

Past, Present, and Foreseeable Actions

Past Actions (Contributed to the Current Condition of the Analysis Area)

- Monument Fire suppression and rehab/BAER work (Summer/Fall 2002)
- Livestock grazing (Early 1900's to 2002)
- Rebuild fences and other range improvements (2003; continue annually)
- Past timber harvest and associated road construction including regeneration harvests (Late 1960s to 1990's)
- Prescribed fire (Awake Timber Sale)
- Replanting conifers in old regeneration harvested areas (2003, 21 acres)
- Recreation activities including dispersed camping, hunting, and ATV use.(2003)
- Hardwood planting; riparian areas (2003)
- Road maintenance including cutting of roadside hazard trees (2003)
- Mushroom picking (2003; annual event for the next 2- 5 years)
- Firewood cutting

Present Actions

- Noxious weed manual control treatments including cutting of roadside hazard trees (annually).
- Maintenance of roads and culverts in fire area (annually).
- Recreation: dispersed camping, ATV use, snowmobile use (annually).
- Full-size vehicle use on open roads and ATV use on open and closed roads (annually).
- Replanting conifers in old regeneration harvested areas (2004, 214 acres)

Foreseeable Actions

- Livestock grazing (begin as early as 2005 if recovery conditions are met and continue annually)
- Firewood cutting (begin in 2009 and continue annually).
- Relocation of trailhead and parking area near junction of 1672 and 1672457; non-motorized vehicle access up the Little Malheur River access into Monument Rock Wilderness; maintenance of trail. (2005)
- Salvage harvest activities on the Wallowa - Whitman NF portion of the fire area (2004 and 2005).
- The fuels loading in the Monument Rock Wilderness will not be reduced and continue to increase.
- Animal damage control to reduce pocket gophers numbers in conifer plantation outside RHCAs (2006).

Forest Vegetation

Introduction

The forest vegetation burned by the Monument Fire exhibits a diverse pattern created by: 1) soil types, 2) aspect, 3) elevation, 4) moisture and temperature regimes, 5) natural disturbances, and 6) past management activities. Approximately 34% of the project area suffered severe burn damage resulting in 90% or more mortality of the trees. On the other extreme, light severity damage in other stands has the appearance of a prescribed burn. Tree mortality is light and patchy. In between these severity conditions, the range of tree mortality is variable, but fire changed the structure of most stands.

Regulatory Framework

The National Forest Management Act (NFMA) requires harvested lands be reforested within 5 years. The Forest Service has established a policy that this requirement is applied to salvage as well as to “green” timber sales. In addition, where no salvage is done, deforested lands should be reforested as quickly as practicable (Regional Forester letter, 11/19/2002).

The Malheur NF Land and Resource Management Plan (Forest Plan) provides Forest-wide management goals and objectives. The applicable standards for the forest vegetation portion of this analysis are:

- Maintain stand vigor through the use of integrated pest management such as stocking level control and species composition in order to minimize losses due to insects and diseases.
- While favoring high quality natural regeneration, consider the effectiveness of various regeneration methods and prescribe the best site-specific method. Satisfactory stocking of any regenerated stand will be expected to occur within 5 years after harvest.
- Use seed collected from phenotypically superior trees from the same seed zone and elevation band for growing planting stock.
- Manage to maintain or re-establish ponderosa pine on sites where ponderosa pine is subclimax.

The Regional Forester’s Forest Plan Amendment #2 gives additional direction for timber sales. Alternatives 2 and 4 propose harvest of green trees so this project is subject to the ecosystem standard (HRV) and size removal restrictions. Alternative 3 does not propose harvesting live trees but still must apply riparian and wildlife standards. The applicable wildlife standards for the forest vegetation portion of this analysis are:

- If late and old structure (LOS) is below HRV, there should be no net loss of LOS. The Interior Columbia Basin Ecosystem Management Project (ICBEMP) terminology used in this document is old forest single-story or old forest multi-story rather than LOS.
- Manipulate vegetation that is not LOS so that it moves towards LOS. Where open, park-like stands occurred historically, encourage the development of large diameter trees with an open canopy structure.

Analysis Method

Data about the Monument area was gathered with a variety of methods. Beginning while the fire was still uncontrolled, District resource specialists who were on the ground advising the suppression forces on appropriate firefighting tactics were also gathering information on fire effects. After the fire was controlled, District staff examined timber stands and mapped fire severity to forest vegetation using aerial photographs flown after the fire. Stands were then stratified and formal stand exams were taken on a portion of each stratum.

All acres in this section are approximate and are generally rounded off to the nearest 10 acres. Structural stage percentages are shown to the nearest percent, since some are at very low levels, but they are not intended to indicate a degree of precision closer than 5%.

The project area is defined as the National Forest lands within the perimeter of the Monument Fire. In some cases, the analysis area includes both surrounding private and Federal forestland up to 5 miles outside the fire boundary to adequately discuss cumulative effects (such as insect spread to stands outside the fire area). This will also include the portion of the Monument Fire on the Wallowa-Whitman National Forest.

Biophysical Environments

Specific plant species tend to be found together in a characteristic set of ecological conditions. The unit of classification based on the probable, or projected, climax plant community type is termed the “Plant Association”, and may be used to describe and classify sets of ecological conditions. The Plant Associations found within the Monument planning area are documented in Plant Associations of the Blue and Ochoco Mountains (Johnson and Clausnitzer, 1992). For purposes of classification and analysis, plant associations may be grouped into areas with like temperature/moisture and fire disturbance regimes called Plant Association Groups (PAGs) or Biophysical Environments.

Stand Resiliency

Many of the forests in the West have been altered from their historical condition since Euro-American settlement. This has occurred as a result of fire suppression, logging, cattle grazing, and other activities. There is an increasing realization that forests of the Blue Mountains evolved with the fire, insects, and other periodic disturbances that occur here and that the historical condition was often more resilient and sustainable than the present condition.

In particular, the Hot Dry and Warm Dry biophysical environments were typically composed of large ponderosa pine and western larch at fairly wide spacing and there was little conifer undergrowth. Periodic low intensity ground fires kept fuel loads at low levels, killed conifer regeneration and kept trees thinned. Low levels of ground fuels and the lack of fuel ladders from the ground to tree crowns reduced the amount of crown fires and widely spaced crowns inhibited the spread of crown fires. With wide spacing, trees grew at sufficient growth rates to increase resistance to bark beetle infestations.

The vegetation has evolved with the periodic disturbances of the region and is adapted to surviving them. The desired condition is to move the forest toward the historical condition for each biophysical environment. This will reduce the risk of uncharacteristically severe fire and restore ecological structure, function, and processes to the forest.

Stands minimally affected by the fire that retained their structure, are qualitatively compared for their resiliency to insect and disease.

Stand Development

In order to compare the alternatives, the establishment of forest stands occurs either naturally or by planting (artificially). Stand establishment has been estimated to take 5 years if planted, natural reforestation would take 10 to 20 years if within the seed fall zone (within 200'-800' of live trees, depending upon species) or 20 to 50 years or even several decades if outside the seed fall zone.

Cumulative Effects

The list of actions identified at the beginning of Chapter 3 was used to analyze the Cumulative Effects. Each one was considered to see if any of them, in combination with actions proposed, had a measurable effect. Those that did were discussed further in the Cumulative Effect sections that follow each topic.

Incomplete/ Unavailable information

Additional field surveys were conducted during the field season of 2003 to better assess tree mortality in the low to moderate severity burn stands. This field reconnaissance indicates mortality is higher than was originally anticipated. The information available on these stands has a high sampling error due to low number of sample plots.

Affected Environment

The topography of the project area is composed of moderate to steep slopes, generally ranging from 25 to 70 percent slope. Elevation ranges from approximately 4,800 feet near the confluence of the Little Malheur River and Camp Creek to 6,600 feet at Elk Flat. The fire burned across all slope aspects.

Fire has been a principle agent of change that historically created, shaped and maintained ecologically sustainable forest types and structures throughout the Blue Mountain region. Each fire event was unique in terms of ignition, timing, location, extent, duration, and severity.

Fire ignitions were not only a result of dry lightening storms but were also purposefully started by native populations (Robbin, 1994). In the Warm Dry biophysical environment (found in much of the Monument Project area) historical fire scare studies indicate a high frequency, low intensity fire regime burned across a portion of the landscape approximately every 12 years (Heyerdalh, 1996). Fire continued to be an important agent of change on the landscape until the late 1800's (Olson, 2000). In the latter part of the 19th century, native populations were increasingly being displaced by Euro-American settlers (Robbin, 1994). As settlers moved in, the influence and effect of fires started by native peoples began to diminish.

Historically, in the Warm-Dry biophysical environments, seral ponderosa pine dominated the landscape because of frequent, low intensity surface fires. Because of the dry nature of these sites and limited seedling establishment, the distribution of trees strongly tended to be found in small patches or clumps. This pattern is a result of frequent low intensity fire and occasional 'hot spots' up to an acre in size resulting from accumulations of fuel where patchy mortality occurred. Stocking levels of dominant overstory trees occurred at nearly threshold level where serious mortality was expected to be caused by bark beetles (Harrod, 1999).

Effects from intense grazing pressure in the late 1800s and early 1900s removed much of the sod-forming grass species that inhibited the establishment of conifer species. Insufficient amounts of grass were present to carry low intensity surface fires across the landscape that would normally remove most conifer seedlings and saplings. In response, a new cohort of conifers species were able to become established and survive at much higher levels than what would occur naturally. With prevailing wet climatic conditions at the turn of the 20th century (Ferguson, 2001), the number of trees per acre of most species increased following settlement, with shade-tolerant/fire-intolerant species showing the biggest gain (Camp, 1999).

The development and establishment of this new age group had both unforeseeable and unintended consequences spatially and temporally. Unlike the small patches or clumps of ponderosa pine that periodically regenerated after a fire, ponderosa pine regeneration with lesser amounts of Douglas-Fir and grand fir seedlings proliferated across the landscape. With continued heavy grazing pressure and fire suppression, these trees were able to persist where normally they would not have existed in such large numbers. Over time, as these stands grew their structural variability decreased because gaps between patches or clumps of ponderosa pine were filled in with younger trees.

As these younger trees began to grow into overstory crowns, a number of different things started to happen. Smaller trees intercepted snow. Snow normally falls to the forest floor and provides surface water inputs as it melts. A portion of this intercepted snow sublimed back into the atmosphere. Limited surface water recharge exacerbated moisture stress competition between the overstory and understory. In drier sites (found in the Warm-Dry biophysical environment), maximum tree competition usually occurs below ground between roots. Ponderosa pine root spread can exceed canopy spread up to five times (Hall 1993). Hence, more moisture competition occurs below ground than above ground.

In the Monument planning area there are several average age groups of ponderosa pine that became established and developed under natural fire regimes. The oldest group is 350 years old, the next oldest is 275 years of age and the youngest grouping is 175 years old. A 100-year-old age class became established and developed without the influence of historical, high frequency, low intensity fire regimes. On some sites, these youngest trees can compete enough for soil growing space that older trees lose their vigor. Understory trees can retard growth of overstory ponderosa pines on dry sites and can have a fatal impact on the overstory (Oliver, 1996).

Through time, with the removal of mature ponderosa pine combined with 90 years of fire suppression, the landscape has been drastically altered. The landscape is now more homogeneous, patch size has increased, and the number of patches has decreased. Forest stands have been simplified, but insect and disease host continuity has been increased, leading to increased probability of insect and disease outbreaks, and more rapid spread of pests across the landscape. The result is a destabilized condition across the landscape (Scott, 1996).

Forest vegetation can be described in terms of plant associations or assemblages of plant species including conifers, hardwoods, shrubs, grasses, and forbs species adapted to utilize available site resources. These assemblages or plant associations form patterns across the landscape in response to available site resources, or environmental gradients of light, moisture, temperature, and soil nutrients (Johnson, 1992).

In addition to responding to environmental gradients, these associations are shaped by disturbance processes including fire, insects, disease, wind, snow and drought conditions. Plant dominance is expressed by those species best adapted to utilize available growing space or site resources in response to inherent disturbance regimes (IDR). The IDR is defined by the types of disturbance frequency, intensity, and extent. These factors shape the vegetation composition and structure supported over time (Everett, 2000).

Environmental gradients, or similar sets of conditions including slope, aspect, moisture, elevation, and soils are relatively constant across the landscape thru time and can be defined in terms of biophysical environments.

Biophysical Environments

There are five distinct found in the Monument project area. These biophysical environments include: 1) Hot Dry, 2) Warm Dry, 3) Warm Moist, 4) Cool Moist, and 5) Cold Dry. The Herbland, Shrubland, and Woodland biophysical environments are also located within the project area and have been aggregated together because they are sparsely distributed. Table V-1 shows the percentage of each biophysical environment found in the Monument project area.

HOT-DRY

The lower elevations (3,000 to 4,500 feet) on south and west facing slopes generally contain plant associations of the hot-dry biophysical environment. These associations cover approximately 370 acres (4%) of the project area. The driest sites were occupied by scattered western juniper and ponderosa pine. In the past, there were fewer trees than were present at the time of the Monument Fire. Juniper woodlands have greatly expanded in the last century (Agee, 1993), and ponderosa pine has encroached into some previously non-forested areas.

The natural fire regime is one of frequent, low intensity, non-stand replacement fire. Trees typically grow in small, even-aged clumps in stands generally dominated by larger ponderosa pine. Few understory trees and shrubs are present. Tree density is somewhat light, resulting in open stands and good growing space, maintaining tree vigor. Mortality from natural fire regimes is light and patchy; rarely is the whole stand killed. Natural reforestation of small patches is often effective, but the large ponderosa pine seed does not disperse very widely with the wind.

WARM-DRY

The mid-elevations (4,500-5,500 feet), and north and east facing slopes at lower elevations, generally contain plant associations grouped in the warm-dry biophysical environment. These areas contain plant associations with climax ponderosa pine, Douglas-fir, or grand fir. Ponderosa pine is a major seral species present in the Douglas-fir and grand fir plant associations. The Douglas-fir with ponderosa pine associations contained a mix of the two species, as well as occasional grand fir. Western juniper may appear on drier sites and groups of quaking aspen may appear on moister sites. Western larch was a component in many of these stands, as well as incidental amounts of lodgepole pine. These plant associations cover approximately 6,015 acres (70%) of the project area.

Generally, the fire regime and stand structure are similar to the hot-dry biophysical environment.

WARM-MOIST

These areas contain wetter climax Douglas-fir and grand fir plant associations covering about 75 acres (less than 1%) of the project area. They occur across a wide range of conditions from the lower portions of southern slopes to the upper middle portion of northern slopes ranging from 2,100 to 5,900 feet in elevation. Ponderosa pine, Douglas-fir and western larch are seral tree species.

Stand replacing fire is the principle, modifying event in this biophysical environment. Understory shrub and plant species readily sprout following a fire event.

COOL-MOIST

These areas contain grand fir and subalpine fir plant associations and cover approximately 640 acres (8 %) of the project area. The cool-moist biophysical environment plant associations are found at elevations generally between 5,500 feet and 6,500 feet, and on north and east facing slopes at lower elevations. The cool-moist (grand fir) associations contain a mix of grand fir, Douglas-fir, lodgepole pine, and western larch, with minor components of ponderosa pine, western white pine, and subalpine fir.

Grand fir associations are generally in the moderate severity fire regime. Stands are fairly continuous and are generally fully stocked. Moderate to high fuel loadings exist because of individual and patch mortality. The fire regime is a mixture of low and high intensity fire in a mosaic pattern across the landscape.

In the subalpine fir associations, fire regimes are usually infrequent, high intensity, stand replacement fire. Trees typically grow in clumps or small stands separated by alpine meadows. Trees grow close together and often retain dense branches all the way to the ground. Some stands separated by alpine meadows do not burn since these meadows do not always carry fire. Stands that do burn, however, burn with great vigor due to the torching caused when ground fire reaches the dense branches. Often the whole patch torches, resulting in complete mortality.

COLD-DRY

Cold-dry biophysical environments principally occur on northern exposures. These areas contain grand fir and lodgepole pine/grand fir plant associations and cover approximately 715 acres (8%) of the project area. Cold-dry biophysical environments are found at elevations generally between 4,250 feet and 6,300 feet on all slope positions. In grand fir plant associations, western larch, lodgepole pine, Douglas-fir, and ponderosa pine are early seral species. In the lodgepole pine/grand fir plant association western larch is usually represented at low coverage levels. Grouse huckleberry dominates the shrub layer of the stands while pinegrass and/or elk sedge dominates the herbaceous layer.

Soil disturbance in these cold dry plant associations will promote early seral tree species along with understory development of shrubs and forb/grass species. These sites are cold but do not limit grand fir establishment. Lodgepole pine is promoted by repetitive fire and/or thinning and vigorous lodgepole pine can retard establishment of grand fir. Insects and disease of lodgepole pine increase as stands stagnate or mature.

GRASSLANDS

Grassland plant associations occur as small meadows throughout the forested plant associations of the project area. They occupy drier, shallow soiled areas, frost pockets, and riparian areas near perennial streams, as well as alpine meadows. Bluebunch wheatgrass communities are found on gentle to moderate slopes mainly on southern exposures and scablands. Bunchgrass communities respond favorably to low to moderate severity fires.

SHRUBLANDS

Shrubland plant associations are found primarily along fringe, or transitional zones between grasslands and ponderosa pine and Douglas-fir plant associations. In addition, shrublands occur at higher elevations in the project area on harsh, southerly exposed and rocky sites. Mountain mahogany, low sagebrush and big mountain sagebrush plant associations can be found at elevations between 4,300 and 5,800 feet on gentle to moderate slopes. The understories of these plant associations are often dominated by bunchgrasses. Sagebrush species, along with Mountain mahogany, are readily damaged by fires that promote bunchgrass production.

Table V-1. Monument Project Area Forest Types

| Biophysical Environment | Acres | % Of Area |
|----------------------------------|-------|-----------|
| Warm Dry | 6,015 | 70% |
| Hot Dry | 370 | 4% |
| Cool Moist | 640 | 8% |
| Cold Dry | 715 | 8% |
| Warm Moist | 75 | 1% |
| Herbland/Shrubland/Woodlands | 720 | 8% |
| Non-Forest (rock, streams, etc.) | 53 | <1% |
| Total Acres | 8,588 | 100% |

Historical Range of Variability

Table V-3 shows the Historic Range of Variability believed to have existed before the 20th century, derived from Forest Service Blue Mountain Area Ecologist analysis, in cooperation with Malheur, Umatilla, and Wallowa-Whitman National Forest silviculturists. Figure 16 (Map Section) identifies post-fire structure. The historical range of variability compares the structural stages of each biophysical environment. These structural stages are defined in Table V-2 below.

Table V-2. Forest stand structures found in the Monument project area

| Structural Stage | Definition | Also Referred to As: |
|--|--|--|
| Stand Initiation (SI) | When land is reoccupied by trees following a stand-replacement disturbance. | Early-successional Early-seral Regeneration |
| Stem exclusion – open canopy (SEOC) | Forested areas where the occurrence of new trees is predominantly limited by moisture. | Mid-successional Mid-seral Young forest |
| Stem exclusion – closed canopy (SECC) | Forested areas where the occurrence of new trees is predominantly limited by light. | Mid-successional Mid-seral Young forest |
| Understory reinitiation (UR) | When a second generation of trees is established under an older, typically seral, overstory. | Mid-successional Mid-seral Young forest |
| Young forest multi-story (YFMS) | Stand development resulting from frequent harvest or lethal disturbance to the overstory. | Mid-successional Mid-seral Young forest |
| Old single story (OFSS) | Forested areas resulting from frequent non-lethal prescribed or natural underburning, or other management. | Late-successional single-story Late-seral single-story Old forest single-story |
| Old multi-story (OFMS) | Forested areas lacking frequent disturbance to understory vegetation. | Late-successional Late-seral multi-story Old forest multi-story |

SOURCE: Quigley, T., Cole, H., "Highlighted Scientific Findings of the Interior Columbia Basin Ecosystem Management Project," General Technical Report PNW-GTR-404, USDA Forest Service; Portland, Oregon, May 1997.

Table V-3. Historic Range of Variability.

| Bio-Environment | SI | SEOC | SECC | UR | YFMS | OFSS | OFMS |
|------------------------|-----------|-------------|-------------|-----------|-------------|-------------|-------------|
| Hot-Dry | 5-15% | 5-20% | 0-5% | 0-5% | 5-10% | 20-70% | 5-15% |
| Warm-Dry | 5-15% | 5-20% | 1-10% | 1-10% | 5-25% | 15-55% | 5-20% |
| Warm-Moist | 1-15% | 0-5% | 5-20% | 5-20% | 20-50% | 0-5% | 10-30% |
| Cool-Moist | 1-10% | 0-5% | 5-25% | 5-25% | 40-60% | 0-5% | 10-30% |
| Cool-Dry | 5-30% | 0-5% | 5-35% | 5-20% | 5-20% | 1-10% | 1-20% |
| Cold-Dry | 1-20% | 0-5% | 5-20% | 5-25% | 10-40% | 0-5% | 10-40% |

Tables V-4 and V-5 show the current condition of stand structures in each whole subwatershed after the Monument Fire.

Table V-4. Post-Fire Stand Structures - Swamp Creek Subwatershed

| Bio-Environment | SI | SEOC | SECC | UR | YFMS | OFSS | OFMS |
|------------------------|-----------|-------------|-------------|-----------|-------------|-------------|-------------|
| Hot-Dry | 3% | | 43% | | 38% | | 16% |
| Warm-Dry | 13% | 2% | 31% | 7% | 33% | | 14% |
| Warm-Moist | 9% | | 36% | | 46% | | 9% |
| Cool-Moist | 20% | | 42% | | 32% | | 6% |
| Cool-Dry | 9% | | 41% | | 24% | | 26% |
| Cold-Dry | 17% | 4% | 40% | 4% | 26% | | 9% |

Table V-5. Post Fire Stand Structures - Upper Little Malheur Subwatershed

| Bio-Environment | SI | SEOC | SECC | UR | YFMS | OFSS | OFMS |
|------------------------|-----------|-------------|-------------|-----------|-------------|-------------|-------------|
| Hot-Dry | 14% | 13% | 24% | 4% | 36% | | 9% |
| Warm-Dry | 14% | 8% | 6% | 7% | 14% | | 51% |
| Warm-Moist | 58% | 1% | 17% | 6% | 13% | | 5% |
| Cool-Moist | 60% | 6% | 7% | 13% | 10% | | 4% |
| Cool-Dry | | | | | | | |
| Cold-Dry | 66% | 1% | 4% | 23% | 2% | | 4% |

As displayed by the above tables, some biophysical environments within the Swamp Creek and Upper Little Malheur River subwatersheds are out of balance with the historical range of structural stages. Generally, the Monument Fire caused a lot of the older structures such as OFMS to move to younger structural stages such as SI, UR, or SEOC. This is due to the

large amount of stand replacement fire. This is more dramatic in the Upper Little Malheur subwatershed than the Swamp Creek subwatershed because the Monument fire burned more of the Upper Little Malheur subwatershed.

For each structural stage, it is considered favorable if current conditions are within or above the historical range of variability. It is desirable to move towards HRV as soon as possible, especially toward old forest conditions if they are below HRV.

Vegetative Response to Fire

Determining potential tree survivorship or mortality after a wildfire is often difficult because of the varied and complex factors governing the survival of fire injured trees. Numerous factors often interact to determine the fate of trees following wildfire including, but not limited to: 1) age, 2) size, 3) crown ratio, 4) bark thickness (and other fire-resistance characteristics), 5) stand density, 6) fuel loading, 7) season of fire and growing site quality characteristics influencing intensity and duration, 8) degree of damage to trees and 9) insect population and disease status. Further discussion of vegetative response to fire can be found in the following documents: Scott (2002), Miller (2000), Johnson (1998), and Scott (1996).

Crown Damage

In order for the aerial crown to survive fire, some buds and branch cambium must survive. Fire can affect foliage in the crown in several ways: complete foliage consumption; complete scorching; or partial scorching. Often, on conifers with short needles, crown scorch is equivalent to crown death because small buds and twigs do not survive. On ponderosa pine, larger buds are shielded by long needles and may survive fires that scorch adjacent foliage. While partially scorched foliage may appear green in color, superheated gases from the fire melt away the protective waxy covering or cuticle. The needles desiccate and eventually turn brown and fall from the tree. Crown injury is more often the cause of mortality than bole damage for fire-adapted species such as ponderosa pine, western larch, and Douglas-fir. Bud survival is more critical for ponderosa pine and Douglas-fir than loss of crown because loss of buds limits photosynthesis.

Bole Damage

Fires of long duration, and under conditions where moderate to high levels of fuels have accumulated around trees are most likely to cause bole charring. In addition, these conditions are likely to kill most, or all of the cambium some length up the bole, or around the entire circumference of the bole. Killing of the cambium effectively “girdles” the tree. Under these conditions, even fire-adapted species that develop thick bark to insulate their cambium (such as ponderosa pine, western larch, and Douglas-fir) are damaged. Even light ground fires readily kill species with thin bark, such as, subalpine fir, lodgepole pine, and young grand fir. In the absence of significant crown damage, preliminary work indicates most conifer species can survive some cambial damage or girdling at the root collar if less than 25% of the circumference of the bole is affected. Trees with cambial damage exceeding 75% of bole circumference will not likely survive. Trees with cambial damage greater than 25%, but less than 75% bole circumference have a 50% chance of either living or dying. Trees with severely damaged cambium may still have functioning xylem taking water to the crown. However, the damaged phloem prevents the return of carbohydrates to the lower bole and root system. Effectively, the tree starves to death.

Root Damage

Because fire frequencies have been lengthened and heavy accumulations of duff and litter have developed, fine roots and small diameter root systems are often in close proximity to the mineral soil surface. As a result, deep-rooted trees such as ponderosa pine, western larch, and Douglas-fir have developed fine roots oriented closer to the surface in the mineral soil and are sometimes found in the duff layer. Under these circumstances, low-intensity surface fires pose an increased risk for elevated levels of tree mortality as fine roots are consumed along with duff and litter or because lethal levels of heat are concentrated into the rooting zone. Loss of these feeder roots may be a more significant cause of tree mortality than structural root damage. Damage to fine feeder roots has been associated with both growth reductions in young ponderosa pine stands and with tree mortality in low vigor, mature stands of ponderosa pine. Even light ground fires readily kill grand fir, subalpine fir, and lodgepole pine. These trees may sustain significant damage to shallow root systems while not exhibiting apparent damage around the root collar or in the aerial crown. While the loss of feeder roots may not kill the tree, it can place the tree under significant stress and predispose the tree to other damaging agents (such as insects and diseases).

Insect Damage

While direct fire damage to the crown, bole, or roots of a tree may not immediately cause mortality, the damage may predispose the tree to bark beetle attack. Bark beetles are the number one biological agent of tree mortality due to wounding by fire. Badly scorched trees are more likely to host successful attacks by western pine beetles, mountain pine beetles, red turpentine beetles, or pine engravers than unscorched or lightly-scorched trees. An injured tree's ability to produce stem-wood and defense chemicals to protect itself against insects and disease is severely restricted after sustaining fire damage. Production of new foliage and feeder roots take precedence over bole-wood and defensive chemicals making the tree vulnerable to bark beetle attack.

Trees that have been severely weakened by various factors such as defoliators, root disease, dwarf mistletoes, moisture stress, and other factors, have less chance of survival after significant injury by fire than healthy, vigorous trees. These weakened trees may succumb to bark beetles in the seasons after a fire, even though they sustained only modest injury from the fire. Damaged trees found in overstocked stands may provide favorable microclimate conditions for successful bark beetle brood production and raise population levels to epidemic levels. Recent evidence suggests large diameter, mature ponderosa pine are especially vulnerable to lethal bark beetle attacks between the second and fourth year after a fire event (Scott et al., 2002).

Burn Severity Rating

Vegetation burned by the Monument Fire forms a diverse severity pattern created by: 1) soil types, 2) aspect, 3) elevation, 4) moisture and temperature regimes, 5) and past management activities. Burn severity vegetation damage was mapped into four categories, light, moderate, severe, and partial (see figure 3, Map Section).¹

¹ Categories follow definitions used from the publication "Vegetation Response after Wildfires in the National Forests of Northeast Oregon" by Charles Johnson Jr. (R-6-NR-ECOL-TP-06-98, page 10).

- ❑ *Light*: Forest Vegetation - leaves and twigs on tree branches partially to completely scorched, mature trees mostly underburned.
- ❑ *Moderate*: Forest Vegetation - leaves and small twigs on tree branches completely scorched, stems and tree trunks charred and partially burned.

The moderate burn severity encompasses a wide variation of conditions. Moderate burn severities are often referred to as lower-end moderate and higher-end moderate. Lower-end moderate burn severities have fewer trees with crown scorch and tree trunks with char. Higher-end moderate severity burns have a higher degree of crown scorch and char on tree trunks. They also exhibit a higher degree of litter and woody debris consumption.

- ❑ *Severe*: Forest Vegetation - all leaves, stems, and twigs on tree branches consumed; trees and tree trunks deeply charred with branches mostly consumed.
- ❑ *Partial (Mosaic)*: These areas contain a mixture of burn severities with no one-severity dominating.

Severe-Burn Affected Stands

The existing vegetation was greatly modified by the Monument Fire in July and August of 2002. Approximately 34% of stands within the project area were killed or heavily damaged. The stands with severe burn damage were converted to an earlier serial stage such as stand initiation (very few or no surviving trees). Some of the most severely damaged stands occur in the Little Malheur River and Camp Creek riparian areas.

Light to Moderate Burn Affected Stands

Forested areas that burned with low (23%) to moderate (40%) intensity, range greatly in vegetation mortality levels. Stands with a substantial number of live trees are found around the fire perimeter where the fire slowed and burned with less intensity or scattered throughout the fire. These groupings of live trees usually occur in areas of low fuels, flat topography, lower stand density, and in stands of fire tolerant species. These factors contributed to reducing local fire severity (especially in the light fire severity areas). In moderate fire severity areas, stand structures range from stand initiation or understory reinitiation where fire damage is at the upper end of the moderate rating to those with limited mortality leaving stand structure as stem exclusion open canopy or young forest multi-story.

Stands with light burn severity range from low density to high density stocking. The low densely stocked stands are located in the southern portion of the project area near Anderson Creek. These stands were thinned within the last 10-year period and prescribed fire was run through the stands in the last 5-year period reducing fuel loading. Many other lightly burned stands are densely stocked and the resiliency of these stands is low to future insect, disease, and wildfire damage.

Environmental Effects

Vegetative Structure

Direct/Indirect Effects

Alternatives 1 (No Action), 3 and 5

Risk of secondary mortality from insects and disease would remain high in some overstocked forested stands within the project area. These stands are primarily light to moderate burn affected stands.

Trees that have been severely weakened by various factors such as defoliators, root disease, dwarf mistletoe, moisture stress, and other factors, have less chance of survival after significant injury by fire than healthy, vigorous trees. Weakened trees may succumb to bark beetles in seasons following a fire, even if they sustained only modest injury from the fire. Damaged trees found in overstory stands may provide favorable microclimate conditions for successful bark beetle brood production and raise population levels to outbreak or epidemic levels. Recent evidence suggests large diameter, mature and over mature large ponderosa pine are especially vulnerable to lethal bark beetle attacks between the second and the fourth year after a fire event (Scott et al., 2002).

Western and mountain pine beetles attack weakened trees and can also spread into nearby stands. Overstocked stands adjacent the fire area may sustain low levels of bark beetle induced mortality.

Approximately 20 per cent of the project area consists of mixed conifer stands containing substantial amounts of Douglas-fir. Douglas-fir bark beetles are expected to spread widely and attack fire-injured trees, eventually killing most trees with intermediate and heavy fire damage. Douglas-fir bark beetles infest 80 to 90 percent of Douglas-fir with greater than 20 percent crown scorch.

Western larch is less prone to bark beetle attack after being wounded by fire. There are few insect or disease problems in western larch, with the exception of mistletoe. Mistletoe can cause decline and eventual mortality due to mistletoe-infected branches becoming so heavy they break off from the bole of the tree. It is likely that dwarf mistletoe-infected western larch will have increased likelihood of being killed from fire due to increased fuels and fire susceptibility (Scott, Schmitt & Spiegel, 2002).

Alternatives 2 and 4

Alternatives 2 and 4 propose 223 acres of resiliency treatments. In these areas, some green trees expected to survive direct effects of the fire will be harvested to reduce inter-tree competition between residual live trees. This will reduce the risk of tree mortality from secondary drought, disease, and insects. The majority of trees removed will be understory grand fir and Douglas-fir (thinning from below). Commercial and precommercial thinning will reduce competition where it is needed between trees for available site resources and growing space in incidental clumps throughout units where fire severity was lighter. With greater availability of resources, ponderosa pine, western larch, and Douglas-fir trees will recover faster from fire damage and have an increased chance of survival.

These stands generally survived a ground fire with some crown fires occurring that created burned “holes” in the tree canopy. Many of these stands are on the margins of the fire area where the fire spread was slowing and fire intensity was diminishing. These trees have survived the Monument Fire at present, but due to denser canopies and existing fuel ladders, these stands are at high risk from being destroyed by future stand-replacement fires. By thinning green trees from below in these stands, fuel ladders will be reduced and distances between crowns will be increased. Therefore, these stands will become more resilient and the risk of losing them to future fires will be reduced.

Surviving trees in the resiliency treatment areas will primarily consist of ponderosa pine, western larch, and Douglas-fir. Promotion of early seral trees such as ponderosa pine will allow developing stands to better resist drought, fire, insect, and disease agents.

The resiliency treatment occurs primarily in the warm dry biophysical environment historically shaped by high frequency, low intensity fire regimes. Removal of understory trees will lessen future risk of fire entering into the crowns of dominant, overstory trees. A change in the vertical fuel continuity within these treatment areas would result in lower fire intensity and severity in the future (see Fire/Fuels, Environmental Effects).

Post fire, structural stages of stands treated with the resiliency treatments will not change with timber harvesting. Resiliency treatments are a combination of approximately 81 acres of stand initiation (SI), 58 acres of understory reinitiation (UR), and 66 acres of stem exclusion open canopy (SEOC) with minor amounts of young forest multi-story (YFMS), and old forest multi-story (OFMS). However, these thinned stands will be more open. Understory and middlestory densities will be reduced by thinning the heavier stocked clumps, usually one or two acres in size, which burned with lighter severity. Outside of the heavier stocked clumps, live trees do not need to be thinned because fire mortality has reduced stocking to at or below the desired density of 60 to 70 square feet of basal area. For example in the SI and UR structure stands, there is generally no need for thinning and no measurable effect to stand density and structure. Residual trees in these stands will exhibit increased growth for the next several years. Therefore, these stands will move towards later structural stages sooner.

Species compositions will change following treatment. The most notable change will be reduction in the proportion of grand fir and Douglas-fir. Fire tolerant species such as ponderosa pine and western larch will comprise the majority of species composition.

Cumulative Effects

All Alternatives

Salvage of fire-killed trees on the Wallowa-Whitman National Forest is a foreseeable action. The salvage will have a slight beneficial effect on reducing insect population buildups and spread into remaining live trees in and near the Monument Fire Recovery Project. These trees would be removed during the summer of 2004 through the winter of 2005. Approximately 11,000+ acres of the Monument Rock Wilderness will remain untreated. There is a risk that insect populations could build in that area and spread into the project area.

Reforestation Activities/ Stand Development

Direct/Indirect Effects

Alternative 1 (No Action) and Alternative 5

Under the No Action alternative, no replanting would occur within the project area. Regeneration of stands burned in the 2003 fire would be slower than those proposed to be artificially regenerated in the action alternatives. It may be decades before a fully stocked young sapling/pole sized stand is present. Lack of a reliable seed source in areas that burned with moderate or high severity is the major limiting factor for natural regeneration. Species composition and tree densities would vary depending on available seed source.

Natural reforestation depends on many factors. These include: seed dispersal; buried seed; seed survival; germination; and seedling survival and growth. All of these factors were greatly affected by the Monument Fire.

Given the conditions for seed dispersal and seedling survival rates of natural regeneration, stocking will vary considerably. In areas with remaining seed sources, reforestation will probably occur within a decade. In the severely burned Camp Creek and Little Malheur

River drainages, natural regeneration will be a slow process, and tree stocking is estimated to be very sparse for up to a century since it is located far from seed sources and will depend on second generation or third generation seed crops or dispersal by animals. Ground vegetation will be very dense and seedling establishment will be very difficult.

The need to reforest the project area will not be met through the No Action alternative. This would directly, indirectly, and cumulatively affect future vegetation patterns across the landscape, affecting many ecosystem functions and resource values.

For this analysis, no planting would occur under Alternative 1. However, Forest Service direction states that deforested lands should be regenerated as quickly as practicable (Regional Forester letter 11/19/2002). Therefore, Alternative 5 would plant 2,845 acres of seedlings in areas identified as severely burned. Artificial regeneration would reforest these areas of the fire in two to five years that otherwise would take several decades to reforest with natural regeneration (as in Alternative 1). Approximately 2,500 acres that burned with moderate severity would not be planted with Alternative 5. These areas may take some time to reforest naturally, but it would not take as long to reforest them as severely burned areas due to availability of seed sources lacking in severely burned areas.

Alternatives 2, 3, 4 and 5

Natural Regeneration

Areas that burned with light severity fire, non-forest areas that occur on rocky or shallow soils, and juniper woodlands would not be planted. Forested areas that burned with lower severities have substantial live trees sufficient to meet management objectives on site without artificial reforestation. If determined by field review or stocking surveys that sufficient natural regeneration is anticipated, these stands will not be planted.

Areas sparsely forested (such as juniper woodlands), had fewer trees under natural fire regimes. By not artificially reforesting these areas, they will be returned to their more open, historical condition and will be more likely to survive future fire events. (See Affected Environment).

Tree Planting

Twenty-one acres of plantations which were destroyed by the Monument Fire were planted in 2003. In 2004, an additional 223 acres of nursery grown trees are anticipated to be available for planting in plantations and precommercial thinning units destroyed by the fire. Species planned to be planted are predominately ponderosa pine, western larch, and some Douglas-fir. Western white pine or lodgepole pine may be planted where cold air drainage is poor. (See Table V-6).

Recommended spacing and species to be planted for all plantations are shown in Tables V-8 and V-9. "Suggested Stocking Levels for Forest Stands in Northeastern Oregon and Southeastern Washington: An Implementation Guide for the Umatilla National Forest" by David C. Powell was used to determine what spacing would be preferred to plant conifer seedling. Target tree sizes and target stocking levels were used for specific plant associations to compute desired spacing needed for planting. These figures have been adjusted to reflect local silvicultural knowledge and experience of reforestation successes.

For relatively flat terrain with good road access, a target average tree size of 11 inches DBH would be grown in 65 years. This would produce adequate numbers of trees per acre desired in the Upper Management Zone for a commercial thin. For stands with good road access, but

situated on steep slopes, an average tree size of 13 inches DBH would be grown in 75 years to produce prescribed number of trees per acre as desired in the Upper Management Zone for a commercial thin. For stands in steep terrain with poor or no road access, a target tree size of 21 inches DBH would be grown in 120 years to produce the number of trees per acre desired in the Upper Management Zone for a final harvest.

In all three scenarios, it was assumed that seedling survival rate for the first five years after planting would be 50% and an additional mortality rate of 2% per decade would occur. Spacing regimes were calculated to preclude the need for a precommercial thin. Also, for the final harvest scenario, spacing regimes were calculated to preclude the need for any commercial entries as well.

Shade cards would be used on higher severity burned areas on south and west slopes throughout the project area, including much of the Camp Creek and Little Malheur River drainages. Shade cards, made from waxed cardboard stapled to wood stakes, reduce seedling transpiration and heat desiccation caused by solar damage on harsh sites during early establishment of seedlings. Shade cards are biodegradable and last 3 to 5 years.

Table V-6. Projected Yearly Reforestation for Alternatives 2, 3, 4, and 5.

| Year | Estimated Planting Acres Alternatives, 2, 3, and 4 | Estimated Planting Acres Alternative 5 |
|-------------|---|---|
| 2003 | 21 | 21 |
| 2004 | 223 | 223 |
| 2005 | 2400 | 1150 |
| 2006 | 2400 | 1150 |
| 2007 | 278 | 301 |
| Total | 5322 | 2845 |

Table V-7. Reforestation and Precommercial Thinning Prescriptions for Alternatives 2, 3, and 4.

| Prescribed Treatment | Spacing | Species | Acres |
|----------------------|---------------------|------------------------|-------|
| RPL | 11' x 11' | 50% PP, 25% WL, 25% DF | 179 |
| RPL | 11' x 11' | 100% LP | 77 |
| RPL | 12' x 12' | 50% PP, 25% WL, 25% DF | 1600 |
| RPL | 12' x 12' | 67% PP, 33% WL | 3 |
| RNP/RPL | 12' x 12' | 67% PP, 33% WL | 34 |
| RPL | 13' x 13' | 50% PP, 25% WL, 25% DF | 367 |
| RPL | 13' x 13' | 67% PP, 33% WL | 11 |
| RNP/RPL | 13' x 13' | 67% PP, 33% WL | 195 |
| RPL | 13' x 13' | 100% PP | 94 |
| RPL | 14' x 14' | 50% PP, 25% WL, 25% DF | 509 |
| RPL | 14' x 14' | 67% PP, 33% WL | 840 |
| RPL | 14' x 14' | 100% PP | 262 |
| RPL | 15' x 15' | 67% PP, 33% WL | 698 |
| RPL | 15' x 15' | 100% PP | 83 |
| SPC/RPL | 18' x 18'/12' x 12' | 50% PP, 25% WL, 25% DF | 109 |
| SPC/RPL | 16' x 16'/12' x 12' | 50% PP, 25% WL, 25% DF | 4 |
| SPC/RPL | 18' x 18'/15' x 15' | 50% PP, 25% WL, 25% DF | 257 |
| SPC | 16' x 16' | | 22 |
| Total Acres | | | 5,344 |

RNP = Reforestation, Natural Regeneration

RPL = Reforestation, Planting

SPC = Precommercial Thinning

Table V-8. Reforestation Prescriptions for Alternative 5.

| Prescribed Treatment | Spacing | Species | Acres |
|----------------------|-----------|------------------------|-------|
| RPL | 11' x 11' | 50% PP, 25% WL, 25% DF | 63 |
| RPL | 11' x 11' | 100% LP | 77 |
| RPL | 12' x 12' | 50% PP, 25% WL, 25% DF | 842 |
| RPL | 13' x 13' | 50% PP, 25% WL, 25% DF | 225 |
| RNP/RPL | 13' x 13' | 67% PP, 33% WL | 15 |
| RPL | 13' x 13' | 100% PP | 54 |
| RPL | 14' x 14' | 50% PP, 25% WL, 25% DF | 249 |
| RPL | 14' x 14' | 67% PP, 33% WL | 642 |
| RPL | 14' x 14' | 100% PP | 156 |
| RPL | 15' x 15' | 67% PP, 33% WL | 479 |
| RPL | 15' x 15' | 100% PP | 43 |
| Total Acres | | | 2,845 |

RNP = Reforestation, Natural Regeneration

RPL = Reforestation, Planting

Alternatives 2, 3, and 4 propose to reforest the same acreages. All areas capable of growing trees and lack sufficient live trees will be planted for each alternative, regardless of whether or not harvest is proposed.

Alternative 5 calls for planting only in the severe fire severity areas. Therefore, only 2,845 acres would be planted. The higher severity burned areas would be regenerated at the same rate as in Alternatives 2, 3, and 4. The major difference between Alternative 5 and Alternatives 2, 3 and 4 lies in the treatment of the moderate severity burned areas. In many of the moderate fire severity areas, some live trees remain and will provide a limited seed source for natural reforestation. On the average, stands are expected to be regenerated at least 15 to 20 years earlier and will have more uniformity with artificial regeneration than with natural regeneration.

Seedling Survival

Upland Areas

If conifer planting is accomplished within two years, seedling survival is expected to range from 60 to 80 percent. After three years post fire, animal damage and competing vegetation may become a problem for seedling survival. If planting is delayed beyond three years, hand scalping and/or reduction of competing ceanothus brush may be needed to control competing vegetation. Animal damage control may be necessary to ensure adequate seedling survival.

Riparian Habitat Conservation Areas

Reforestation survival in riparian habitat conservation areas is expected to be lower than average because of animal damage and competing vegetation. Even if planted within two years, seedling survival in riparian areas is expected to range from 20 to 60 percent. Herbaceous recovery will occur quickly in most riparian areas and competing vegetation is

expected to be a problem. Hand scalping of vegetation around planted seedlings will be necessary to obtain adequate seedling survival.

Big Game Damage

Big game browsing is expected to be heaviest the first few years following the fire, when seedlings are very small. The Monument Fire area has traditionally been heavily used by big game. If damage becomes apparent, protection of planted seedlings would be administered with application of big game repellent (BGR). Big game repellent is made from putrefied chicken egg solids. The odor of the substance deters big game from browsing. The repellent is mixed with food coloring and applied to terminal buds and upper whorls of branches of trees. BGR is highly biodegradable and has not shown any adverse effects to surrounding vegetation or animals. BGR would be applied to planted seedlings in all plantations, including riparian habitat conservation areas. There are no direct or indirect effects associated with the application of BGR on soil or water quality. BGR contains no toxic substances, degrades rapidly, and does not accumulate in the soil. The combination of strict application procedures leads to the conclusion that BGR will not affect soil or water quality.

Heat Desiccation

Salvaging will reduce shade in the high severity burned areas. Amount of shade remaining will vary slightly by alternative, depending on the level and distribution of trees retained for snags. Decreased shade will slightly increase the range of weather extremes both hot and cold, possibly affecting vegetation growth.

The planting in the shade of logs, stumps and rocks increases the chance of seedling survival. Shade cards would be used on higher severity burned areas on south and west slopes throughout the project area. The use and location of shade cards would be determined on a case-by-case basis.

Pocket Gopher Control

Pocket gopher control is not a proposed action in this analysis, but may be necessary if gopher activity threatens the ability to reforest specific areas. Any future gopher control measures would be prescribed on a site-specific basis, and would be analyzed in a separate environmental analysis. The potential need for future gopher control activities is difficult to predict and will be determined by conducting site-specific surveys. Gopher control methods would only be prescribed on upland areas where gopher activity is above thresholds that threaten plantation survival. Generally, this is when surveys reveal 20% or more of seedlings are being killed by gopher related damage.

No gopher baiting would be considered within any RHCA in the project area. The project area is located within the Little Malheur River and the North Fork of the Malheur River watersheds which are proposed critical habitat for bull trout. There is an expectation of lower survival rates and some of these RHCAs may require additional planting.

Gopher damage and mortality generally occur in severely burned areas that demonstrate a flush of grasses and forbs a few years after a wildfire. Populations will increase after 2 or 3 years when grasses and forbs increase in the fire area. Gophers will then move in from the fire perimeter and their population will enlarge due to the abundance of food. Even if food is abundant, populations are expected to remain low for several years within interior portions of the fire. Gopher populations will remain low during this period because gophers repopulate fire areas from the perimeter inward. Therefore, potential for gopher damage is greater

around fire perimeters. Generally, if plantations survive for five years after planting, pocket gopher damage is minimal and not expected to cause plantation failures. Stands that are planted several years after a fire are at a higher risk from gopher damage and mortality.

Cumulative Effects

All Alternatives

Approximately 21 acres were planted in the project area in 2003, utilizing available tree seedlings. Approximately 223 acres of planting is scheduled for the spring or 2004. This would be a beneficial effect. No vegetation control treatments or animal damage control (except BGR applications) are planned for Federal lands that are reforested.² Therefore, there will be no additional cumulative effect from this project.

Livestock Damage

Livestock grazing will not be reinitiated on the Monument project area for at least two growing seasons following the fire. Livestock is not anticipated to have a major impact on planted seedlings in upland areas of the fire. The northern portion the Swamp Creek Subwatershed is an active unit that is grazed by about a thousand head of sheep. Grazing would not be an effect on seedling survival as long as sheep will not be allowed to graze conifer plantations until seedlings have reached 3 feet in height. Reintroduction of sheep grazing will not occur in plantations until reviewed for suitability by the District Silviculturist and the District Rangeland Management Specialist. Sheep grazing in these areas may be beneficial to seedling establishment by reducing competition of herbaceous vegetation.

In addition, cattle graze the Upper Little Malheur subwatershed. Cattle grazing is to be deferred for two growing seasons. Damage to seedling will be minimal in the uplands due to the large size areas scheduled for planting. Some plantations may sustain trampling damage from heavy cattle concentrations. Trampling is expected in localized areas such as along fences, in bedding areas, or in dusting areas.

After planted conifers have developed to the point that cattle can see them above shrubs and grasses, (three feet tall, on average) trampling damage is expected to be minimal.

Consistency with Direction and Regulations

NFMA (Regional Forester's Letter of Nov. 19, 2002)

The No Action Alternative does not meet direction to reforest areas as soon as possible in severely burned areas. If the No Action Alternative were selected in this analysis, further analysis to meet the intent of the Regional Forester's direction would be conducted under a different NEPA document. Alternatives 2, 3 and 4 all meet direction urging that salvaged areas shall be reforested within 5 years and other deforested areas be reforested as soon as possible. Alternative 5 meets the direction that all deforested areas will be reforested as soon as possible either by artificial or natural regeneration.

Forest Plan

The No Action Alternative does not meet Forest Plan direction to establish ponderosa pine (and other early seral species) in appropriate sites to increase fire, insect, and disease resiliency. Alternatives 2, 3 and 4 meet direction to minimize losses due to insects and

² Reforested stands include 244 acres planted/ to be planted in the spring of 2003 and 2004.

disease by establishing ponderosa pine and western larch, where appropriate, within 5 years after harvest. Alternative 5 will reforest severely burned areas with ponderosa pine, western larch, and some Douglas-fir. Naturally regenerated areas, under Alternative 5, will be regenerated with a mix of conifer species depending on available seed sources. Both natural regeneration and planting are utilized to reforest burned areas and seed is collected from superior trees within the seed zone and elevation band.

Regional Foresters Forest Plan Amendment #2 (Screens)

All alternatives meet direction not to decrease old forest structural stages. Alternatives 2, 3 and 4 better meet the objective to shorten the time to grow additional old forest structure. Stands would reach old forest structural stages more quickly in response to these prescriptive treatments since planting would establish trees 10 to 40 years sooner than would natural regeneration. Alternative 5 shortens the time required to grow additional old forest structures in severely burned areas by planting seedlings. The moderately and lightly burned areas would be regenerated naturally within 5 to 10 years where available seed sources exist. Alternatives 2 and 4 would not remove green trees greater than 20.9 inches DBH. Also, in Alternatives 2 and 4 (where resiliency treatments would take place), residual tree growth would be increased after thinning and stands would move toward old forest structural stages sooner.

The type of timber sales proposed in Alternatives 2, 3, and 4 is exempted from the interim ecosystem standards including HRV under Amendment #2 except for the wildlife standards. These sales are a combination of salvage with incidental green volume and commercial thinning located outside currently mapped old growth. Also, the sales maintain all remnant late and old seral and/or structural live trees greater than 21" dbh since only dead and dying greater than 21" dbh are removed.

Irreversible/Irretrievable Effects

There are no anticipated long-term irreversible commitments of the forest vegetation since it is renewable as long as soil productivity is maintained. There may be short-term losses of growth related to soil compaction, but compaction would be kept below 20% of the forest area, and growth reduction on compacted ground is about 15%. This would result in a total maximum growth loss of approximately 3% of growth potential until the compaction gradually diminishes (in about 50 years).

Fuels/Fire

Introduction

Fire and Fuels Management

Fuels management is a process of managing hazards in relation to the size and severity of a potential fire event. The objective of fuels management is to reduce fire hazards to a level where cost effective resource protection is possible should a wildfire ignite. Of the three components affecting wildland fire behavior (fuels, weather, and topography), only fuels can be manipulated.

The Fire and Fuels section also addresses the following fuels related issues:

1. Fuel loading and fire behavior
2. Firefighter and Public Safety
3. Air Quality

Regulatory Framework

Malheur Forest Plan and the Malheur Fire Management Plan

The Malheur National Forest Plan includes Forest-wide fire management direction consistent with other resource goals. The Malheur National Forest Fire Management Plan is an annually updated operational guide.

The Malheur National Forest, Forest Land and Resource Plan provides forest-wide standards and identifies *management direction* for Fire:

- 1) Initiate initial suppression action that provides for the most reasonable probability of minimizing fire suppression costs and resource damage. These suppression actions should be consistent with probable fire behavior, resource impacts, safety and smoke management considerations.
- 2) Identify, develop and maintain fuel profiles that contribute to the most cost-efficient fire protection program consistent with management direction (Forest Plan IV-4).

The Malheur National Forest further describes Forest-Wide Standards for Fire Management and, Residue Management:

- 1) Manage residue profiles at a level that will minimize the potential of high intensity, catastrophic wildfires and provide for other resource objectives in individual management areas.
- 2) Utilize the Regional fuels analysis process as a guide to determine the most cost effective fuel profile for fire protection purposes. Finance treatment beyond the level needed for fire protection by the requesting or benefiting function.
- 3) Use all methods of fuel treatment as prescribed by site-specific analysis to achieve resource management objectives. Encourage utilization of wood residue as a priority treatment consistent with long-term site productivity and wildlife habitat needs (Forest Plan IV-44).

The Fire Management Plan is a working document and is updated annually or as policy or Land and Resource Management Plans change. The Malheur National Forest Fire Management Plan (FMP) defines how the Fire Management Program will be implemented on the Malheur National Forest.³ The Fire Management Program is based on achieving resource objectives defined in the Land Management and Resource Management Plans for the Forest.

National Fire Plan

The National Fire Plan provides national direction for hazardous fuel reduction, restoration, rehabilitation, monitoring, applied research, and technology transfer. The USDA Forest Service and Department of Interior (DOI) are developing a common strategy for reducing

³ For more information see the Malheur National Forest, Fire Management Plan.

fuels and restoring land health in fire-prone areas. The DOI and USDA Forest Service have prepared 2 Documents outlining strategies for protecting people and the environment by restoring and sustaining land health; Protecting People and Sustaining Resources in Fire-adapted Ecosystems.⁴ The purpose of the strategy is to:

1. Establish national priorities for fuel treatment; ensuring funding is targeted to the highest risk communities and ecosystems.
2. Evaluate tradeoffs between programs that emphasize wildland urban interface and those emphasizing ecosystem restoration and maintenance.
3. Measure the effectiveness of strategic program options at different funding levels.
4. Recommend a strategic program to best achieve national fuel treatment objectives for community protection and ecosystem restoration and maintenance.
5. Emphasize landscape-scale, cross-boundary treatments that reduce hazards while providing benefits to other ecosystem values.

The strategy will emphasize improved working relationships between federal land managers, as well as with multiple key disciplines inside the various land management and regulatory agencies and bureaus across geographic scales. Applicable National Fire Plan goals and objectives include:

- Reducing the number of small fires that become large
- Restoring natural ecological systems to minimize uncharacteristically intense fires
- Creating new jobs in both the private and public sectors
- Improving capabilities of state and volunteer fire organizations
- Reducing threats to life and property from catastrophic wildfire

Analysis Method

Future fuel loading (tons/acre) and fire behavior for the Monument Fire were modeled on data obtained through stand exams and pre-cruise timber inventory data. All data was collected from a stratified inventory method. Stands sharing like stand characteristics were grouped into strata and individual stands were chosen from within each strata for inventory using variable and fixed radius plots. Weights of standing dead trees were calculated from the Handbook for Predicting Residue Weights of Pacific Northwest Conifers (Brown et al., 1977). Weights include limbs, tops, and boles of dead trees. Foliage weight was subtracted as it was consumed in much of the project area during the fire. Tons per acre for each strata was determined by averaging fuel loadings⁵ for treatment areas within that strata.

By calculating average fuel loading (tons per acre), we are able to predict future fire behavior and effects, using BEHAVE Plus.⁶

⁴ See - A Cohesive Strategy (USDA Forest Service, 2000) and Integrating Fire and Natural Resource Management - A Cohesive Strategy For Protecting People By Restoring Land Health (DOI, in draft).

⁵ Desired fuel loading estimates were derived from a white paper, Coarse Woody Debris and Succession in the Recovering Forest, (Brown et al. 2001).

⁶ BEHAVE Plus is a fire behavior prediction and fuel modeling system that predicts fires rate of spread, flame length, spotting potential and fire effects on vegetation.

Affected Environment

Recent Fire History

Wildland fires are the major natural disturbance to vegetative communities on the Malheur National Forest. Fires fulfill an important role in ecosystem maintenance and development across the landscape. The historical fire return interval prior to fire suppression was 12 years in the Dugout Creek Resource Natural Area located in the North Fork Malheur River Watershed, in close proximity to the Monument Fire (Heyerdahl & Agee, 1996).

The Monument Fire Area, Upper North Fork Malheur and Little Malheur Watersheds, have experienced several large wildfires, fires greater than 100 acres, during the past 64 years (Table F-1). Average area historical large fire size is approximately 13,980 acres. Small fires have also occurred during this time. However, for the purposes of this analysis, emphasis is placed on large fires. This area experiences lightning and human-caused ignitions annually. Given this level of activity, there is a high probability of an ignition occurring within the Monument Fire area at any given time in the future.

Table F-1. Historic Large Fires

| Fire | Size | Year |
|---------------|--------|------|
| Big Cow | 39,000 | 1939 |
| Glacier | 11,000 | 1989 |
| Monument Rock | 10,000 | 1990 |
| Sheep | 11,306 | 1989 |
| Ironside | 10,110 | 1994 |
| Powder | 5,780 | 1994 |
| Camp Creek | 125 | 2001 |
| Monument | 24,525 | 2002 |

Given the recent large fire history, it is reasonable to assume that another large fire event is likely to occur within the next 30 years. Therefore, this timeframe was used to set the temporal boundary utilized by the analysis found in the fire/fuels section.

The current fire condition of the Monument Fire Recovery is best described by historic fire regimes. The document titled *Protecting People and Sustaining Resources in Fire-Adapted Ecosystems – A Cohesive Strategy*, established five primary fire regime groups for all lands managed by the U.S. Forest Service in the United States. Fire regimes are broad and simplified categories that help us understand ecological fundamentals of biotic systems that occur on this landscape. The categories also help depict previous relationships with fire as a process, acting upon these systems at different frequencies and resulting severities for thousands of years. For the purpose of this analysis, fire regimes are grouped into three categories⁷, high severity regimes, moderate severity regimes and low severity regimes (Walstad et al, 1990).

⁷ Severity represents fire effect on vegetation and soils.

Table F-2. Fire Regimes

| Fire Regime Group | Frequency (Fire Return Interval) | Severity | Monument Fire Acres | Project Area Acres |
|-------------------|----------------------------------|----------------|---------------------|--------------------|
| I | 0 to 35 years | Low severity | 7,489 | 6,254 |
| II | 0 to 35 years | High severity | 1,096 | 575 |
| III | 35 to 100+ year | Mixed severity | 9,120 | 1,252 |
| IV | 35 to 100+ year | High severity | 2,408 | 481 |
| V | > 200 years | High severity | 73 | 0 |

High severity regimes are typically moist and cool, except in the grasslands. Fires are very infrequent (more than 100 years between fires), 0 to 35 years in the grasslands. Fires are usually high intensity, stand replacement fires, but burn for short duration. Fires are associated with drought years and an ignition source such as lightning (Huff and Agee, 1980). Fire Regimes II and IV best represent high severity regimes. Fire Regime II represents drier grassland types, tall grass prairie, and some chaparral ecosystems. Fire Regime IV is the long-interval, stand-replacement fire regime. Lodgepole pine/subalpine fir forests best characterize this fire category. Regime IV is especially characteristic of the Monument Fire, specifically in the mid to higher elevations in the Monument Rock Wilderness Area. There is a very small area (73 acres) in the Monument Rock Fire represented by Fire Regime V, which represents rocky, low productivity sites.

Moderate severity fire regimes are the most difficult to characterize. Fires are infrequent (25 to 100 years). They are partial stand replacement events that include areas of high and low severity. The overall effect is patchiness over the landscape as a whole. Individual stands often consist of two or more age classes. The moderate regime occurs in areas with typically long summer dry periods. Historically, fires lasted weeks to months. Periods of intense fire behavior are mixed with periods of moderate and low-intensity fire behavior. In some instances, fire frequency is higher than low severity regimes due to higher litter production. Fire Regime III represents the mixed conifer forests in the Monument Fire Area.

Low severity fire regimes are associated with frequent fires of low intensity. Frequent fires limit the time allowed for fuel to accumulate. Typical fire intensity is moderate to low. Low severity regimes (Fire Regime I) in the Monument Fire were represented by ponderosa pine forests. Historically, fuels in ponderosa pine forests rarely accumulated to high levels because of the frequent fires that consumed fuels and pruned residual trees. Frequent fires on these sites likely consumed down material as well. It is doubtful that logs remained on the forest floor long enough to provide wildlife habitat.

The ponderosa pine forests in the Monument Fire burned with uncharacteristically high intensity. 5,654 acres were burned at moderate or high severity, versus 1,835 acres that burned at low severity. The resulting condition left large numbers of standing dead trees that will fall and build up a heavy fuel loading. 53 percent of the second growth pine could fall by year five, while ponderosa pine and western larch with resin-hardened bases may stand for many years after mortality. Decay will be present in all dead trees. The extent of decay will be highly variable, due largely to moisture patterns and amount of direct contact with the ground.

Mixed conifer forests (Regime III) burned at higher severities than would normally be expected. These forests burned at high severity over three times the amount of acreage as burned at low and moderate severity. Ponderosa pine will begin to fall most rapidly in mixed conifer stands, followed by grand fir and Douglas fir respectively, in the first five years. Again decay will be present, but the extent will be affected by moisture patterns. Wet conditions encourage the spread of decay. Western larch, subalpine fir and lodge pole pine present in mixed conifer forests will have minimal fall down and decay in the first five years.

Higher elevation forests will remain the most unchanged during the first five years following the Monument Fire. Ground cover will begin to reestablish and lodgepole pine seedlings should begin sprouting profusely in these forests. The fire-killed lodgepole pine and subalpine fir snags should remain largely intact, except for limbs and tops damaged by wind throw.

Approximately 11,538 acres of the Monument Rock Wilderness Area on the Malheur National Forest burned in the Monument Fire. The Monument Fire burned areas of the wilderness spared by the Monument Rock Fire of 1990. There have also been other large fires in the vicinity of the Monument Fire: Big Cow 1939, Ironside 1994, Powder 1994, and Camp Creek 2001.

Table F-3 illustrates the way the Monument Fire moved through existing Fire Regime categories and biophysical environments in the project Area. These figures suggest the Monument fire burned with more severity than would be expected historically. This is particularly relevant given that 73% of the Project Area is categorized as Fire Regime 1 and so should have burned with low intensity.

Table F-3. Fire Regimes/ Biophysical Environments/Severity Acres

| Fire Regime (% Project Area) | Biophysical Environment | Historic Burn Severity | Acres Burned at <u>Low</u> Severity | Acres Burned at <u>Moderate</u> Severity | Acres Burned at <u>High</u> Severity |
|---------------------------------|--|------------------------|-------------------------------------|--|--------------------------------------|
| Regime I 72% | Warm Dry and Hot Dry | Low | 1,835 | 3,008 | 2,646 |
| Regime II 7% | Warm Dry and Hot Dry (e.g. Grasslands) | High | 43 | 410 | 643 |
| Regime III 15% | Cool Moist | Mixed | 76 | 2,097 | 6,947 |
| Regime IV 5% | Cold Dry and Lodgepole | High | 0 | 937 | 1,471 |
| Regime V <1% | Rock and unproductive sites | High | 0 | 0 | 73 |
| Total Acres | | | 1,954 | 6,452 | 11,780 |

Areas treated by prescribed fire, thinning and/or burning activities prior to the Monument Fire, burned at low to moderate severity. The Monument Fire Regime Map further depicts this fire behavior (see Figure 17, Map Section).

Prescribed fire treatment areas:

Awake Project. The southern boundary of the project area was treated with commercial and pre-commercial thinning followed by management ignited prescribed fire (underburning), on approximately 1,500 acres, completed within the Monument Fire Recovery Project Area in November 2001 (Awake project). The Monument Fire exhibited low fire intensity and rate of spread in this area, some areas remained unburned by the Monument Fire due to lack of available fuel (see photos 1 and 2, Fire/Fuels Specialist Report).

Spring Timber Sale. Plantations resulting from the Spring project also burned at low severity. Spring units were clearcut, burned and reforested approximately 9 years prior to the Monument Fire. Spring units did not burn in the Monument Fire, however there was scorch damage present along the boundaries with severely burned, forested areas (see photo 3, Fire/Fuels Specialist Report).

Hunter Timber Sale. The Hunter project units suffered mixed severity, being located within areas burned at high severity under extreme fire behavior conditions. The Hunter units were also clearcut, burned and reforested. The Hunter units located in the Little Malheur River drainage burned at low to high severity within each individual unit. Exposure to radiant or convective heating caused most of the damage to the previously mentioned units. Foliage

was still present on vegetation (tree seedlings, low shrubs, etc.) in the high severity burn areas of these units. The upslope portions of these units exhibited some damage due to convective or radiant heating, terminal leaders on western larch seedlings were killed, but the seedlings flushed new leaves from undamaged buds immediately following the fire. (See photo 4, Fire/Fuels Specialist Report)

Fuels Consumed by the Monument Fire

Surface fuel loading was completely consumed in the Monument fire, except in the treated areas previously mentioned. Fine fuels and small branch wood were also consumed on trees in the high severity burn areas and most of the moderate severity burn areas due to torching or crown fire activity. This has significantly reduced the potential for large fire activity for approximately the next 10 years. Development of duff and litter layers will occur, but fine fuels and smaller branches (.25 to 1 inches diameter) will be absent until vegetation recovers in sufficient quantity and distribution to begin producing litter (needles, leaves, cured grass, etc.). Tree tops, branches and tree boles are already beginning to accumulate in all areas where forested acres suffered fire damage (see photo 4, Fire/Fuel Specialist Report).

Large down wood, including large rotten logs, were consumed in the Monument Fire. Large logs described as moisture reservoirs against drought and wildfire were also consumed. The accumulation of large logs (especially partially decayed logs), contributed to fire growth and to fire severity. The operations section chief on the Monument Fire, Jeff Pendleton, stated that areas containing these large “punky logs⁸” were receptive for fire brands⁹ and had numerous spot fires that crews were unable to suppress. These areas were located in forested areas adjacent to the Spring Project units (see photos 3 and 4, Fire/Fuels Specialist Report), which did not burn. Large down wood is beginning to accumulate in the recovering forest, at varying fall down rates.

Environmental Effects

Common to All Alternatives

Direct/Indirect Effects

The influence of fine fuels such as litter, duff, grasses, and small woody fuels (less than 3 inches diameter) have the most effect on spread rate and intensity of fires. These fuels are used in fire behavior models developed for predicting fire behavior of initiating fires (Rothermel, 1983).

Course woody debris (>3inches) has little influence on spread and intensity of the initiating fire; however, it can contribute to development of large fires and high fire severity. Fire persistence, resistance-to-control, and burnout time (effects to firefighter and public safety, soil heating and tree mortality) are significantly influenced by loading, size, and decay state of course woody debris (Brown et al. 2001). It is generally accepted that most, but not all, of the snags will be on the ground within 10 to 30 years creating a future fire and fuels concern.

The optimum quantity of downed course woody debris (CWD) is about 5 to 15 tons per acre for Fire Regime 1 and 10 to 25 tons per acre for Fire Regime 3 and 4 (Brown, 2003). These fuel loadings take into account wildlife and soils concerns. A re-burn involving these

⁸ “Punky” logs are logs that are partially decayed.

⁹ A fire brand is burning material transported by wind from burning debris.

quantities of CWD should not lead to unusually severe fire effects.¹⁰ If quantities of CWD are at the high end of the range and composed of mostly smaller diameter pieces (3-6 inches), adverse soil heating might occur at very low fuel moisture contents. A modifying factor in determining optimum CWD levels lies in the notion that the larger the diameter of downed CWD, the greater the loading that can be allowed without resulting in undesirable fire effects (Brown, 2001).

Natural regeneration of trees and reforestation activities will also affect future fire severity in the Monument Fire Recovery area. Trees planted at lower plant spacing could develop into stands exhibiting high stand density. This crowding could also lead to high fire severity in the future. This would require additional vegetation management, thinning and piling of created thinning slash, to mitigate future prescribed fire activities or fire severity.

Regeneration from remaining natural seed sources and wider tree planting spacing would also serve to reduce future fire severity in addition to any other fuels management activities.

A snag retention study conducted on the Sleeping Child Fire, Bitterroot National Forest showed nearly 50% snag attrition in the first five years (Lyon, 1977). Recent studies also support this in second-growth Ponderosa Pine reporting a 53% fall-rate within the first five years (Hadfield, Magelssen & Wood, 1996-2000). Snags smaller than three inches were virtually nonexistent after 15 years, while snags larger than eight inches fell sporadically, not at a constant rate.¹¹ The alternating high and low periods of attrition suggest a possibility of 20 to 30 percent wind throw mixed with years of almost no loss (Lyon, 1977). Within ten years, the previously cited research suggests that fire killed trees in the Monument Fire area will begin to develop into a heavy surface fuel loading increasing the probability of a high severity fire during subsequent fire events.

¹⁰ Normal fire severity would include up to 50% mortality of 20-year-old ponderosa pine regeneration (6" dbh, 30' height) in areas meeting desired maximum fuel loading.

¹¹ The study transects were inventoried every two years. Because transects were not inventoried annually, large wind throw cannot be confirmed for any single year

Alternative 1 (No Action)

*Direct/Indirect Effects***Table F-4. Average Fuel Loading/No Action**

| Area | Tons/Acre | Desired Fuel Loading (Tons/acre)* |
|------------------------|-----------|--------------------------------------|
| Camp Creek RHCA | 87 | 5 to 15 |
| Little Malheur RHCA | 60 | 5 to 15 |
| Uplands L. Malheur | 31 | 5 to 15 |
| Uplands N. Fork | 33 | 5 to 15 |

* Desired tons/acre was taken from Brown, Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest, Pg. 7.

Alternative 1 (No Action) would leave the Monument Fire Recovery Project area in its existing condition. This would leave a fuel loading approximately 31-33 tons per acre in the uplands and 60 to 87 tons per acre in the riparian habitat conservation areas (consisting mainly of standing dead trees). This is a significant amount of fuel given that the desired maximum fuel loading in the project area is 15 tons per acre.

The southern boundary of the project area burned with low severity. This area was treated by the Awake Natural Fuels Project in November 2001. Awake employed commercial and pre-commercial thinning followed by management ignited prescribed fire on approximately 1,500 acres. The Monument Fire exhibited low fire intensity and rate of spread in this area, allowing fire suppression crews a safe control point to contain the Monument Fire. Fuel reduction activities would not occur under this alternative.

Under this alternative, fuel loading would remain constant through long-term snag attrition into the surface fuel loading. This is significant when examining large fire occurrence in the area adjacent to and including the Monument Fire. The continual buildup of large woody debris will add future available fuel that will lead to high severity fire and long burning duration in the event of a landscape scale wildfire.

Cumulative Effects:

With regard to cumulative effects, geographic boundaries for this analysis include the Upper North Fork Malheur and Little Malheur River subwatersheds. The temporal boundary is 30 years into the future (the expected fire return interval in the dry sites). The Monument Fire has created an overabundance of early seral conditions within the fire area. This abundance, in addition to burn patterns from previous large fires (Table F-1) has caused a mosaic of early

seral conditions across the landscape. Fire salvage on 779 acres of the Monument Fire is proposed on the portion of the fire on the Wallowa-Whitman National Forest.

Past actions affecting the number of snags, fuel loading, fire intensity, and fire severity include prescribed burning, pre-commercial thinning, timber harvest, insects and disease, and fire suppression. Reasonably foreseeable actions include the natural falling, accumulation and decay of snags, fire suppression activities and some thinning and prescribed burning. Given the extent of the area affected by the Monument Fire, no specifics have been determined at this time regarding the location of future project proposals. It is likely that future projects would be designed to decrease fuel loads in dry sites across this landscape.

As the analysis area begins to recover, natural regeneration would be established where seed sources exist, or residual seed remained in the soil. The development of new/young stands would increase available fuel that could burn as time progresses. The No-Action Alternative 1 may provide a cumulative contribution to a continuing disruption of succession processes.

Given the fire return interval in Fire Regime I, the probability of another high severity wildfire will increase as vegetation recovers and begins producing fine fuels. A re-burn at high severity could prolong the dominance of stand establishment conditions at large spatial and temporal scales.

Alternative 2

Direct/Indirect Effects

Table F-5. Fuel Loading/Alternative 2

| Areas | Existing Tons/Acre | Post-Harvest Tons/Acre | Desired Fuel Loading (tons/acre)* |
|---------------------------|-----------------------|-----------------------------------|---|
| Camp Creek RHCA | 87 | 50 | 5 to 15 |
| Little Malheur RHCA | 60 | 26 (17-19 after handpiling) | 5 to 15 |
| Uplands L. Mal | 31 | 7 | 5 to 15 |
| Uplands N. Fork | 33 | 9 | 5 to 15 |

* Desired tons/acre was taken from Brown, Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest, Pg. 7.

Alternative 2 would reduce future fuel loading by approximately 24 tons per acre in the uplands and 34 to 37 tons per acre in RHCAs. This reduction would be accomplished by removing all dead trees 12" > across the 4,542 acres of proposed salvage.¹² 2.4 snags/acre > 21" DBH would be retained. Residual woody debris generated by salvage operations would be lopped and scattered. Areas treated with resiliency treatments would harvest trees by whole tree yarding. Yarding would reduce the amount of activity-generated debris, thereby reducing residual fuel loading in the North Fork Malheur River uplands. This process would

¹² This figure is inclusive of dead trees 12" to 20" in RHCAs.

leave residual fuel loadings of <8 to 11 tons per acre in the uplands, meeting desired fuel loading for dry sites. Twenty-six to 50 tons per acre would be left in RHCAs, failing to meet desired fuel loadings for dry sites. No further fuel treatment is being proposed in upland areas due to benefits to soil productivity, reduced erosion impact, and wildlife benefit. Additional hand piling will be necessary in RHCAs where post-harvest monitoring indicates fuels concentrations exceed 15 tons per acre. Hand piling in the Little Malheur River RHCA would reduce fuel loading by another 7-9 tons per acre. This reduction would result in fuel levels within 2 to 4 tons per acre of meeting desired fuel loading for dry sites. Hand piling would be excluded in the flood plain of the Little Malheur River and would be limited to fuels up to 6" diameter. The Camp Creek RHCA would not meet desired fuel loading. Additional fuel treatment activities such as post harvest handpiling in Camp Creek would not be sufficient to lower residual fuel loading after harvest to within maximum loading guidelines.

Salvage activities in the Upper Little Malheur River Subwatershed would increase fuel loading of activity-created fuels in helicopter yarding treatment areas. These salvage activities would increase fuels in the 1 to 6" diameter size classes. Fire hazard would remain low for approximately 0 to 10 years, until vegetation recovers, due to lack of fine fuels and decomposition of wood in contact with the ground. Long-term, potential fire severity would be reduced as smaller diameter fuels decompose and large woody debris (the proposed salvage) is removed.

Cumulative Effects

Past, Ongoing & Forseeable Actions

Alternative 2 proposes fuel reduction on a total of approximately 4,311 acres equating to 50% of the Monument Fire Recovery Project area, and 18% of the total Monument Fire area (Malheur & Wallowa-Whitman National Forests). This is in addition to the 779 acres of proposed fire salvage on the Wallowa-Whitman National Forest portion of the Monument Fire. At the landscape scale, this alternative would lead to a substantial change in potential fire intensity and fire severity. A disruption of fuel continuity within proposed treatment units would result in lower fire intensity and severity on these sites in addition to previously treated areas (Awake Natural Fuels Project).

Reasonable foreseeable actions include: 1) the natural fall, accumulation, and decay of snags, 2) fire suppression, and 3) some thinning and prescribed burning. Given the extent of the area affected by the Monument Fire, no specifics have been determined at this time regarding the location of future project proposals. It is likely future projects would be designed to decrease fuel loads in dry sites across this landscape

Alternative 3
Direct/Indirect Effects

Table F-6 Fuel Loading/Alternative 3

| Area | Existing Tons/Acre | Post-Harvest Tons/Acre | Desired Fuel Loading (tons/acre)* |
|---------------------------|-----------------------|---------------------------|---|
| Camp Creek RHCA | 87 | 87 | 5 to 15 |
| Little Malheur RHCA | 60 | 60 | 5 to 15 |
| Uplands L. Mal | 31 | 14 | 5 to 15 |
| Uplands N. Fork | 33 | 14 | 5 to 15 |

* Desired tons per acre was taken from Brown, Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest, Pg. 7.

Alternative 3 would reduce future fuel loading by approximately 19 tons per acre by harvesting conifers > 12" diameter, that are dead at the time of marking, and retaining 12.0 snags per acre across the 2,825 acres¹³ of proposed salvage and leaving all snags in RHCAs. This would leave a residual fuel loading of 14 tons per acre in the upland treatment units, meeting the desired fuel loading. Fuel loadings in RHCAs would remain at 87 tons per acre in the Camp Creek RHCA and 60 tons per acre in the Little Malheur River RHCA, not meeting the desired fuel loading. Activity-created fuels would be scattered due to breakage and limbing during harvest activities. Treatment areas harvested with ground based skidding equipment would remove trees down to 9" DBH and whole-tree skid to landings. Fuel accumulation at landings would be piled and burned. Salvage activities in the Upper Little Malheur River Subwatershed would increase fuel loading of activity created fuels in helicopter yarding treatment areas to a level that increases fuels 1 to 6" diameter. Fire hazard would remain low until vegetation recovers (approximately 0 to 10 years), due to lack of fine fuels and decomposition of wood in contact with the ground. Yet, fire hazard would remain higher than Alternative 2 due to attrition of dead and dying trees outside treatment areas. Long-term, predicted future fire intensities and duration would remain high, except in upland treatment areas, due to potential fuel loading remaining on site.

Cumulative Effects

Past, Ongoing & Forseeable Actions

Alternative 3 proposes to treat fewer total acres than Alternative 2. Proposed fuel reduction would occur on approximately 2,943 acres, 34% of project area and 12% of the total fire area (Malheur & Wallowa-Whitman NFs), in addition to the 779 acres of proposed fire salvage on

¹³ Acreage includes 34% of project area, 12% of the total Monument fire area on the Malheur & Wallowa-Whitman NF.

the Wallowa-Whitman National Forest portion of the Monument Fire. Cumulative effects for this alternative would be the same as Alternative 2.

Alternative 4

Direct/Indirect Effects

Table F-7. Fuel Loading/Alternative 4

| Area | Existing Tons/Acre | Post-Harvest Tons/Acre | Desired Fuel Loading (tons/acre)* |
|---------------------------|-----------------------|---------------------------|---|
| Camp Creek RHCA | 87 | 87 | 5 to 15 |
| Little Malheur RHCA | 60 | 60 | 5 to 15 |
| Uplands L. Mal | 31 | 7 | 5 to 15 |
| Uplands N. Fork | 33 | 9 | 5 to 15 |

* Desired tons/acre was taken from Brown, Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest, Pg. 7.

Alternative 4 proposes fuel reduction on a total of approximately 3,344 acres. This acreage size equates to 39% of the Monument Fire Recovery Project area, and 14% of the total Monument Fire area (Malheur & Wallowa-Whitman NF). At the landscape scale, this alternative would lead to a substantial change in potential fire intensity and fire severity. However, RHCAs would not be treated with any fuel reduction activities, excessive fuel loadings would be maintained in those areas. A disruption of fuel continuity within proposed treatment units would result in lower fire intensity and fire severity on these sites in addition to the previously treated areas (see Awake Natural Fuels Project).

Alternative 4 would reduce future fuel loading by approximately 25 tons per acre in upland treatment areas. The uplands would be left with an average fuel loading of approximately 9 tons per acre. This amount of fuel falls well below the maximum desired fuel loading of 15 tons per acre. Fuel accumulations generated by harvest activities would be lopped and scattered in treatment areas yarded by helicopter. Treatment areas harvested with ground based skidding equipment would remove trees down to 9" DBH and whole-tree skid to landings, where fuel accumulation would be piled and burned.

Salvage activities in the Upper Little Malheur River Subwatershed would increase fuel loading of activity-created fuels in helicopter yarding treatment areas to a level that increases fuels 1 to 6" in diameter. Fire hazard would remain low, until vegetation recovers (approximately 0 to 10 years), due to lack of fine fuels and decomposition of wood in contact with the ground. Long-term, fire intensities and duration will be reduced due to removal of large woody debris 12" > by harvest operations.

Cumulative Effects

Past, Ongoing & Forseeable Actions

Alternative 4 proposes to treat fewer total acres than Alternative 2. Proposed fuel reduction would occur on approximately 3,344 acres or 39% of the Monument Fire Recovery Project area, and 14% of the Monument Fire area (Malheur & Wallowa-Whitman NF), in addition to the 779 acres of proposed fire salvage on the Wallowa-Whitman National Forest portion of the Monument Fire. Cumulative effects for this alternative would be the same as Alternative 2.

Alternative 5:

Direct/Indirect Effects

Direct/indirect effects are the same as Alternative 1, (No Action). However, 779 acres of fire salvage is proposed on the Wallowa-Whitman National Forest portion of the Monument Fire.

Cumulative Effects

Cumulative effects are the same as those disclosed for Alternative 1 (No Action)

Consistency with Direction and Regulations

Malheur National Forest Plan and Fire Management Plan

Alternatives 1 & 5 are not responsive to objectives and standards in the Forest Plan, as it will not allow the utilization of prescribed fire in the future because fuel loadings will be high and outside of the historical range of variability.

Alternative 2 is responsive to the objectives and standards in the Forest Plan. Proposed fuel reduction activities will minimize the potential of high intensity fire that also results in a cost-efficient protection program, as fires would show low resistance to control. Reduced fuel levels would create a fuel profile that will allow use of prescribed fire to meet land management objectives. Fuel levels would be within the historical range on much of the landscape allowing compatibility with the role of fire. This alternative would meet standards relating to air quality.

Alternative 3 is only partially responsive to objectives and standards in the Forest Plan. It is responsive to Forest Plan direction as described above for Alternative 2 on the acres proposed for treatment, however, untreated acres would not meet objectives and standards in the Forest Plan. Burning activities proposed with this alternative will meet standards relating to air quality.

Alternative 4 is only partially responsive to the objectives and standards in the Forest Plan. Burning activities proposed with this alternative will meet standards relating to air quality.

National Fire Plan

Alternative 1 is not responsive to the National Fire Plan.

Alternative 2, 3 and 4 are responsive to the National Fire Plan by reduction of hazardous fuels. Alternatives 2 and 4 reduce more acres of hazardous fuels than Alternative 3.

Laws and Regulations

State and federal air quality regulations would be followed. All burning would be done in accordance with the Oregon State Smoke Management Plan in order to ensure that clean air requirements are met.

The Monument Recovery Project area lies directly adjacent to the Monument Rock Wilderness Area. The prevailing winds are from the southwest and west. During the day, diurnal heating forces air up valley and up slope out of the area, sometimes into the Unity Valley. During the night, air follows the drainages in the area downstream. Inversions affect air quality the most during the winter months, but during the rest of the year inversions sometimes develop in the morning hours and dissipate by noon.

The Strawberry Mountain Wilderness Area is the only Class I airshed located in close proximity, (13 miles west of the analysis area). A Class I area allows only very small increments of new pollution above already existing air pollution levels. There are several homes scattered in Unity Valley that can be affected by smoke from nearby burning.

Currently, air quality in surrounding sensitive areas is limited to short term impacts. These impacts result from wood burning, prescribed burning, and field burning to the west. The greatest impact to the Strawberry Mountain Wilderness Area is from field burning in the Willamette Valley and Central Oregon. This burning affects haziness and can last for several days in the spring and summer.

The only burning proposed in the project area in Alternatives 2, 3, and 4 would be landing pile burning and in Alternative 2 additional piles within RHCAs would be burned. These smoking producing activities would be very short in duration and limited to very few acres.

In compliance with the Clean Air Act, burning of any kind will not occur unless prior approval is granted by Oregon Department of Forestry. All amounts of PM10 emissions will be calculated using the CONSUME software, which is also submitted with planned burn operations to the Oregon Department of Forestry to determine compliance with the Clean Air Act.

Sensitive Plants

Regulatory Framework

The Malheur National Forest Plan (pages IV-32 to IV-33) requires managers to:

- Assess all proposed projects involving habitat changes or disturbance having potential to alter the habitat of threatened, endangered or sensitive plant and animal species.
- Perform biological (field) evaluation for use in planning of proposed projects when sensitive species are present or suspected. Conduct surveys in cooperation with other agencies and groups to document the locations of sensitive species populations and to provide more specific information on habitat requirements and relative management guidelines.

Analysis Method

Sensitive plants suspected to occur on the district are derived from the 1999 Region 6 Sensitive Plant List. A prefield review and field survey are conducted to determine the presence/absence of TES species, or their habitats. Once presence/absence of TES species or their habitats is documented, impacts to individuals or habitat can be assessed.

Prefield Review

Many sources of information were consulted during the prefield review to determine the presence/absence of TES species, or their habitats, within the Monument Recovery Project¹⁴

The prefield review was performed to identify all sensitive species that could be encountered within the proposed Monument Recovery Project area. No existing accounts of TES plant populations within the project area were found. However, potential habitat exists in the riparian areas of Hunter Creek for ten species listed as Sensitive by Region 6: *Botrychium ascendens*, *B. crenulatum*, *B. lanceolatum*, *B. minganense*, *B. montanum*, *B. pinnatum*, *Carex backii*, *C. interior*, *C. parryana*, and *Phacelia minutissima*. Potential habitat for *Carex backii*, *C. interior*, *C. parryana*, and *Phacelia minutissima* also exists in the riparian areas of the Little Malheur River and Camp Creek. Potential habitat also exists within the Upper Little Malheur River subwatershed and Swamp Creek subwatershed for three species listed as Sensitive by Region 6: *Lomatium ravenii*, *Achnatherum hendersonii* and *A. wallowaensis*.

Affected Environment

The affected environment is identified first by reviewing the Forest GIS and sensitive plant database to locate known sensitive plant populations occurring in or near the project area. Second, to identify habitats that may harbor sensitive plants, the physical and biological features in the project area are correlated with those in which sensitive plants are known or suspected to occur (Nelson, 1985). Habitats suspected of harboring sensitive plant populations are identified based on aspect, elevation, and ecoclass (plant association). Brooks et al. (1991) describes specific habitat features for Malheur National Forest sensitive species. Forest botanists have compiled habitat data from field surveys for the remainder of species with potential occurrence, listed since the above book was written. Lastly, potential habitats identified in step 2 are surveyed for new populations of sensitive plants.

Field surveys in 2002 identified potential habitat for thirteen species listed as Sensitive by Region 6: *Achnatherum hendersonii*, *A. wallowaensis*, *Botrychium ascendens*, *B. crenulatum*, *B. lanceolatum*, *B. minganense*, *B. montanum*, *B. pinnatum*, *Carex backii*, *C. interior*, *C. parryana*, *Lomatium ravenii*, and *Phacelia minutissima*.

Field surveys in 2003 focused on areas identified in 2002 as potential habitat. All areas outside of RHCAs determined to be good habitat were surveyed. All areas inside RHCAs determined to be good habitat and to have activities proposed within them were also surveyed. Due to low potential for effects, areas within RHCAs that were determined to have limited potential habitat and have no activities proposed within them, were not

¹⁴ Sources consulted include: Regional Forester's Sensitive Species List, Malheur National Forest Sensitive Species Plant List, Sensitive Plants of the Malheur, Ochoco, Umatilla, and Wallowa-Whitman National Forests (1991), Forest or district sensitive species database(s) and the GIS mapping layer(s), Oregon Natural Heritage Program, *Rare, Threatened and Endangered Plants and Animals of Oregon* (2001), project area maps (topographic maps and aerial photographs) and pertinent literature (on file or borrowed from other sources)

surveyed. Field surveys in 2003 documented two sensitive species on an unnamed category 2 tributary to Camp Creek, *Botrychium minganense* and *Listera borealis*. For additional information about sensitive species in the planning area, refer to the Monument Recovery Project, Biological Evaluation.

Environmental Effects

Alternative 1 (No Action)

Direct and Indirect Effects

The No Action Alternative would have no direct or indirect effects to sensitive plant populations because no ground disturbing activities are proposed.

Alternatives 2, 3, 4 and 5

Direct and Indirect Effects

Re-locating designated old-growth areas would have no direct or indirect effects to sensitive plant populations because no ground disturbing activities are part of this activity.

Proposed road maintenance, reconstruction and road closure activities would have no direct or indirect effects to sensitive plant populations because no ground disturbing activities are proposed within potential sensitive plant habitats or known sensitive plant sites.

Proposed helicopter and service landings (Alternatives 2, 3, and 4), temporary road construction (Alternatives 2, 3, and 4), and skid trail rehabilitation activities would have no direct or indirect effects to sensitive plant populations because no sensitive plant sites are located in these areas.

Proposed road decommissioning would have no direct effects to sensitive plant populations because no sensitive plants are present in these areas except for decommissioning of Forest Road 1672479. *Listera borealis* and *Botrychium minganense* have been documented in an unnamed category 2 tributary to Camp Creek next to Forest Road 1672479. As part of the decommissioning process of Forest Road 1672479, a plugged culvert where the unnamed category 2 crosses the road would be removed.

Potential direct effects to *Botrychium minganense* from removing this culvert could include uprooting or crushing of individuals and indirect effects include changes in hydrology, which may negatively affect this sensitive species in the short-term. In the long-term, removing the culvert could be beneficial because over time the stream would return to a more natural condition. Potential effects to *Botrychium minganense* may impact individuals, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population of this species (MIIH).

Potential direct effects to *Listera borealis* from removing this culvert could include uprooting or crushing of individuals and indirect effects could include changes in hydrology as well as smothering of individuals from silt deposits, which may negatively affect this sensitive species in the short term. In the long-term, removing the culvert would return the stream course to a more natural condition potentially benefiting *Listera borealis* if they are still present. Since the distribution of *Listera borealis* is limited, the potential effects will impact individuals with a consequence that the action may contribute to a trend towards federal listing or cause a loss of viability to the population or species (WIFV).

Prior to any ground disturbing activities associated with road decommissioning on the portion of Forest Road 1672479 where two sensitive plant sites are located, resource specialists including botany, hydrology/fisheries, and engineering would review and revise (if necessary) the decommissioning plan to reduce potential impacts to these sensitive plant populations.

Indirect effects of skid trail rehabilitation and road decommissioning would be reduced damage to the riparian area supporting these species' habitat in the long term because motorized access to this area would be eliminated. Hydrologic function would also improve (see effects section on Hydrology), thus improving potential habitat for *Botrychium* and *Carex species*, *Listera borealis*, and *Phacelia minutissima* in the long term.

Proposed skid trail rehabilitation and decommissioning Forest Road 1672479 may require erosion control through direct seeding of the roadbed. Preferably, local, native grasses would be seeded; however, the source for these grasses has not yet been fully developed. To reduce the risk of creating competitive stress on sensitive plant species, only annual, non-persistent grasses would be used because they pose less threat of long-term competitive stress.

Proposed hand planting of conifer seedlings would have no direct or indirect effects to the two known sensitive plant sites because this area was unburned and has no need for reforestation. Proposed hand planting of conifer seedlings would have no direct or indirect effects to *Lomatium ravenii*, and *Achnatherum species* because these activities would not take place in potential habitat for these sensitive species. Proposed hand planting of conifer seedlings would have no direct or indirect effects to *Botrychium* and *Carex species*, *Listera borealis*, and *Phacelia minutissima* because these species were not found (except as noted above).

Proposed big game browsing protection including the application of Big Game Repellent (BGR) would have no direct or indirect effects to the two known sensitive plant sites because this area was unburned and has no need for reforestation.

Alternative 2

Direct and Indirect Effects

Proposed Salvage – HSV treatment areas 12, 13, 14, 17 and 24 are adjacent to potential habitat for *Lomatium ravenii*, and *Achnatherum species*. These areas were surveyed in 2003 and no sensitive plants were found therefore there would be no direct or indirect effects to these sensitive plant species as a result of these treatments.

RHCA salvage treatment areas 40 thru 49, 51 and 52 are within potential habitat for *Botrychium* and *Carex species*, *Listera borealis* and *Phacelia minutissima*. These treatment areas were surveyed in 2003 and no sensitive plants were found therefore there would be no direct or indirect effects to these sensitive plant species as a result of these treatments. These treatments would also have no impact on the two known sensitive plant sites because they are located outside of these areas.

Removal of dead and dying conifer trees through helicopter logging would have no direct effect on potential habitat for these species. In the Little Malheur River RHCA slash would be hand piled and burned. This activity should have no direct or indirect effects to potential habitat because hand piling would be excluded in the flood plain and limited to fuels up to 6" diameter. In Camp Creek RHCA slash would be lopped and scattered and would have no direct effects to potential habitat. Indirect effects from lopping and scattering slash would be

beneficial because the slash would act as a barrier to ungulates, thereby permitting some form of protection.

The 2002 Monument Fire has reduced shading along the lower reaches of the Little Malheur River to about 40% of pre-fire conditions. Current shading along the upper reaches of the Little Malheur River and along the lower reaches of Camp Creek is about 3% of pre-fire conditions and consists primarily of boles of standing dead trees (refer to the Aquatics section for more detailed information on stream shading). The indirect effects of salvaging timber in RHCAs would likely reduce shading along lower Camp Creek and Little Malheur River by 1% compared to Alternative 1. An additional 1% reduction in shade would have no measurable effects on potential habitat for these species.

Alternative 3

Direct and Indirect Effects

Proposed Salvage – HSV treatment areas 13, and 24 are adjacent to potential habitat for *Lomatium ravenii*, *Achnatherum hendersonii*, and *Achnatherum wallowaensis*. These areas were surveyed in 2003 and no sensitive plants were found; therefore there would be no direct or indirect effects to these species as a result of these treatments.

Alternative 4

Direct and Indirect Effects

Proposed Salvage – HSV treatment areas 12, 13, 14 and 24 are adjacent to potential habitat for *Lomatium ravenii*, and *Achnatherum species*. These areas were surveyed in 2003 and no sensitive plants were found; therefore there would be no direct or indirect effects to these species as a result of these treatments.

Cumulative Effects Common To All Alternatives

Botrychium species, Carex species, Listera borealis and Phacelia minutissima

Past domestic grazing, timber harvesting and fire suppression have contributed to changes in riparian habitats and the plant communities they support. The distribution and vitality of *Botrychium species*, *Carex species*, *Listera borealis* and *Phacelia minutissima* before these management activities began are unknown.

Historic grazing has resulted in loss of potential habitat for these species through stream downcutting and accelerated erosion processes that alter local surface hydrology. Past timber harvesting has also increased erosion and altered hydrologic relationships. Historic logging practices included skidding logs through riparian areas, which could have destroyed existing plants but could have also provided soil openings for new plants to establish. Fire suppression may have caused a decline in populations through increased competition for soil moisture and nutrients by shade-tolerant plant species.

The 2002 Monument Fire has altered riparian habitats and the plant communities they support (see aquatics and vegetation section). This fire has altered the habitat conditions for these species most likely leading to insufficient moisture levels due to decreased shading and/or greater competition by other plant species due to increased light availability.

Cottonwood, willows and dogwoods were planted in the riparian areas along the lower reaches of the Little Malheur River and Camp Creek in June 2003; additional hardwoods will be planted over the next two to three years. Planting riparian hardwoods along Camp Creek will decrease the time it takes the stream to recover from effects from the 2002 fire. This in turn will decrease the time it takes to restore riparian habitat ultimately benefiting *Botrychium species*, *Carex species*, *Listera borealis* and *Phacelia minutissima*.

Future foreseeable activities such as resting the area from livestock grazing for a minimum of 2 growing seasons would have short-term beneficial effects on these sensitive species habitat. Cumulative effects with the resumption of livestock grazing are unlikely if grazing occurs after the recovery of stream channels (refer to aquatics section for description of stream recovery). If resumption of grazing occurs prior to recovery of stream channels than channel recovery will be delayed and full recovery may not occur. This in turn would negatively impact these species habitat. Under the Action Alternatives this would be a cumulative effect to *Botrychium minganense* and *Listera borealis*.

Future activities are also planned by the Unity Ranger District of the Wallowa-Whitman National Forest on national forest lands within the 2002 Monument Fire. Activities proposed by the Wallowa-Whitman National Forest are not expected to have cumulative effects on *Botrychium species*, *Carex species*, *Listera borealis* and *Phacelia minutissima* because salvage harvest would not take place in RHCAs.

Lomatium ravenii, *Achnatherum hendersonii* and *A. wallowensis*

The habitat in which these sensitive plants grow influences the kinds of disturbances they have been subjected to. *Lomatium ravenii* grows on lithosolic soils defined as “a great soil group of azonal soils characterized by an incomplete solum or no clearly expressed soil morphology and consisting of freshly or imperfectly weathered rock or rock fragments” (Brady, 1974). This type of soil provides a very low-nutrient, shallow substrate that cannot support many plants; therefore, this habitat is very sparsely vegetated with little fuel to carry a fire and little to no forage to attract grazers.

Lomatium ravenii, *Achnatherum hendersonii* and *A. wallowaensis* grow in an environment naturally unaffected by fire because of limited fuels. *Lomatium ravenii* appears unaffected by grazing because of sparse forage where it grows. It has been shown that the more common Indian ricegrass, *Achnatherum hymenoides*, has decreased in abundance under heavy grazing pressure (Murphey, 1959). It is highly likely *Achnatherum hendersonii* and *A. wallowaensis* have also decreased with heavy grazing. However the distribution and vitality of these species before management activities began are unknown.

Past timber harvest activities may have affected these species because habitat areas were not protected from harvest activities. These areas, known as scab flats, may have been used in the past as landing sites, parking areas or may have had logs skidded through them.

Because these sensitive plants grow in a habitat almost devoid of vegetation, these sites serve as a natural fuel break and were unaffected by the 2002 Monument Fire. However, these sites were impacted by suppression activities. Tractor fire line and seeding of fire lines was completed in potential habitat as a result of the fire. Increased motor vehicle traffic as a result of suppression activities may have compacted potential habitat for these species.

Activities proposed in this EIS under all alternatives would have no measurable effects on these sensitive species because these species have not been documented in the area.

Future foreseeable activities such as resting the area from livestock grazing for a minimum of 2 years would have short-term beneficial effects to these species habitat. Resumption of grazing should have no cumulative effect to *Lomatium ravenii* and sensitive *Achnatherum species* because they are not present in the project area.

Future activities are also planned by the Unity Ranger District of the Wallowa-Whitman National Forest on national forest lands within the 2002 Monument Fire. These activities are not expected to have cumulative effects on *Lomatium ravenii*, *Achnatherum hendersonii*, and *A. wallowensis* because these species have not been documented in the area. Additionally, salvage harvest activities would not occur in their habitat.

Effects and Determinations of Effects for Sensitive Species

Determinations of effect" are provided for sensitive species in FSM 2670 and in the May 15 and June 11, 1992 Associate Chief/RF 2670 letters on this topic.

Achnatherum hendersonii and A. wallowensis

Under the No Action Alternative and Alternatives 2, 3, 4 and 5, there would be NO IMPACT (NI) to *Achnatherum hendersonii* and *A. wallowensis*.

Botrychium species

Under the No Action Alternative there would be NO IMPACT (NI) to *Botrychium species*.

Under alternatives 2, 3, 4 and 5, activities may impact *Botrychium minganense* individuals, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population of this species (MIIH).

Under Alternatives 2, 3, 4 and 5, there would be NO IMPACT (NI) to other *Botrychium species*.

Carex species

Under the No Action Alternative and Alternatives 2, 3, 4 and 5, there would be NO IMPACT (NI) to *Carex species*.

Listera borealis

Under Alternatives 2, 3, 4 and 5, activities will impact individuals with a consequence that the action may contribute to a trend towards federal listing or cause a loss of viability to the population or species (WIFV).

Under the No Action Alternative, there would be NO IMPACT (NI) to *Listera borealis*.

Lomatium ravenii

Under the No Action Alternative and Alternatives 2, 3, 4 and 5, there would be NO IMPACT (NI) to *Lomatium ravenii*.

Phacelia minutissima

Under the No Action Alternative and Alternatives 2, 3, 4 and 5, there would be NO IMPACT (NI) to *Phacelia minutissima*.

Consistency with Direction and Regulations

All alternatives are consistent with the Forest Plan and other direction with respect to botanical resources.

Consultation

There are no known federally listed TES plant species within the project area. No consultation with the regulatory agencies such as the U.S. Fish and Wildlife Service was need.

Irreversible/ Irretrievable Effects

There are no irreversible and irretrievable commitments of resources that may result from the alternatives with respect to botany.

Noxious Weeds

Regulatory Framework

The Malheur Plan forest wide standard #188 (under protection from noxious weeds) is to implement weed control programs to confine present infestations and prevent establishment of noxious weeds in new areas. Other weed direction is included the Forest Service Manual and in the Federal Noxious Weed Act of 1974. These policies require cooperation with state, local, and other federal agencies in the application and enforcement of all laws and regulations relating to management and control of noxious weeds.

Analysis Method

Activities that expose bare ground or areas where vehicle traffic occurs were used to assess the potential of spreading weeds. Acres affected by tractor yarding, old skid trail restoration, and helicopter landings were chosen as indicators to evaluate effects, because off-road equipment use would disturb soil during harvest activities and could spread seed or reproductive plant parts stored in the soil. Roads are a significant source of seed and off-road equipment use has the potential to greatly increase weed spread to large areas. Planting conifers would also ensure that ground cover is more quickly established and site conditions are not as favorable to noxious weeds.

Affected Environment

Noxious weeds, located on the Prairie City Ranger District, are concentrated on roads, recreation sites, and other areas that have ground disturbance. The spread of noxious weeds are mainly by vehicle traffic, recreational use, livestock grazing, and ground disturbing activities.

Following fire suppression activities, noxious weeds likely spread by vehicle traffic and use of heavy equipment. The open ground conditions that increased light and the nutrients in the ash also improved conditions for noxious weed spread. The open machine lines and safety zones are also very susceptible to invasion. In addition to the spread of existing populations,

a major threat is the introduction of more weeds into the fire areas by equipment. There was no equipment washing stations for vehicles arriving at or leaving the fire areas.

In the summer of 2003, field surveys were conducted adjacent the firelines to identify noxious weed sites. Surveys were primarily along system roads adjacent the fire perimeter. The Monument project file contains a map of the locations of the new weed sites. Prior to this survey, no locations were documented before the fire (Technical Specialist's Report Burned Area Emergency Rehabilitation, 2002) but field personnel had knowledge of widespread occurrence.

The 2003 survey documented 52 weed locations within or adjacent to the Monument Fire project area (Malheur NF portion). On the Wallowa - Whitman NF portion of the fire to the east, six infestation sites were identified and additional widespread occurrence of houndstongue is also found (Monument Fire Recovery DEIS Whitman Unit, Chapter 3 Noxious Weeds).

Survey personnel used "Weed List of Grant County" list to determine target species. Ten species of noxious weeds occur in or adjacent the Monument Fire project area: yellow toadflax, diffuse knapweed, spotted knapweed, Canada thistle, scotch thistle, musk thistle, houndstongue, St. Johnswort, teasel, and white top. Species of greatest concern are spotted knapweed, diffuse knapweed, yellow toadflax, and white top, because these weeds can spread quickly, crowding out native plants, and are difficult to eradicate once established.

Approximately 35% of the total weed acres within the project area burned with moderate to high severity. The remaining 65% burned at a low severity or did not burn. For most invasive species this means the plants probably were not killed and will probably resprout and produce seed or additional underground parts from which they will produce new plants. The species that will probably survive include dalmatian toadflax, diffuse knapweed, field bindweed, and houndstongue. Most weed sites are located within 300 feet of roads or old harvest units.

Environmental Effects

Alternative 1 (No Action)

Direct/Indirect Effects

The risk of noxious weed spread along open roads would continue since there would not be a reduction in open road miles. Since roadways support the heaviest populations of noxious weeds and pose the biggest threat for invasion by not decreasing vehicle access this alternative would have the greatest risk of vehicles spreading noxious weeds into the project area. There are few areas within the project area that do not have vehicle access.

Alternative 1 would also not plant conifers on any upland areas. The risk is increased since weeds could be established within the project area before native vegetation could occupy the site.

Alternatives 2, 3, and 4

Direct/Indirect Effects

There are known populations of weeds within treatment areas primarily along roads. There is a risk that off-road harvest equipment could spread existing weed seed or plant parts that survived the fire below ground and cause new populations to be established.

These alternatives would also construct 0.4 to 0.6 miles of temporary road. Ground disturbance would also occur during ground skidding operations, landing construction, road maintenance, skid trail obliteration, and road decommissioning. The risk of weed spread is minimized during logging since the majority (80-85%) of the harvest uses helicopter yarding methods, minimal ground disturbance. The risk that weeds might spread and find favorable growing sites would be also reduced by contract provisions that require off-road equipment to be cleaned before entering National Forest lands and requiring seeding disturbed areas. The design measures are included to report and treat weeds lowers the risk substantially, since monitoring shown early treatment successfully eliminates weeds.

The road closure and decommission projects would reduce open road density within the two subwatersheds by 16.2 miles. This will reduce the risk of weed spread by motorized vehicles. The risk of weed spread would be further reduced by conifer planting throughout the project area. By establishing ground cover quickly, conditions would be unfavorable for weed establishment and native plants could establish first.

Alternatives 5

Direct/Indirect Effects

Ground disturbance would occur during road maintenance, skid trail obliteration, and road decommissioning that would increase the risk of weed spread. The design measures to require equipment cleaning would reduce the risk of bringing in new weeds into the area.

The risk of spread is decreased in Alternative 5 since there is a reduction in the open road density that limits the use by motorized vehicles. The road closures and decommissioning projects would reduce open road density to motorized vehicles by 26.0 miles. This provides a greater reduction of risk of weed spread by motorized vehicles than proposed in Alternatives 2, 3, and 4.

Common to All Alternatives

Cumulative Effects

The past, ongoing, and reasonably foreseeable activities listed at the beginning of Chapter 3 were reviewed for possible cumulative effects.

There is a risk that the fire itself may have stimulated undocumented weed populations and that weeds were transported into the project area by off-road equipment during suppression activities. These weeds could germinate and spread, but this risk would be reduced because the Forest has decided to monitor for noxious weeds on disturbed areas created by fire suppression activities over the next three years. Some manual removal of weeds is anticipated. These areas include hand and machine fire lines, constructed safety zones and landing sites, and roads (Technical Specialist's Report Burned Area Emergency Rehabilitation, 2002).

No cumulative noxious weed spread is anticipated related to projects proposed on the Whitman Unit portion of the Monument Fire recovery. Ground disturbing activities and road use would be limited to the Whitman Unit portion of the fire area.

As another precaution, livestock grazing will be deferred for at least 2 growing seasons in those allotments affected by the fire. This management strategy is important for both the short and long-term recovery of the area to assure that vegetation is re-established. This action should also reduce the risk of domestic livestock transporting seeds into the fire area and ensure that conditions in the future will not be as favorable for weed establishment.

Consistency with Direction and Regulations

All alternatives are consistent with the Forest Plan and other direction with respect to noxious weeds.

Irreversible/ Irretrievable Effects

There are no irreversible and irretrievable commitments of resources that may result from the alternatives with respect to noxious weeds.

Soil

Regulatory Framework

The Malheur National Forest Plan meets all legal and regulatory requirements for soil conservation. Forest Service Manual R6 Supplement No. 2500.98-1, section 2520.2 says objectives of soil management are "To meet direction in the National Forest Management Act of 1976 and other legal mandates. To manage National Forest System lands ... without permanent impairment of land productivity and to maintain ... soil ... quality. Soil quality is maintained when soil compaction, displacement puddling, burning, erosion, loss of organic matter and altered soil moisture regimes are maintained within defined standards and guidelines." Therefore, where an action maintains detrimental impacts within the standards and guidelines of the Forest Plan, legal requirements for soil conservation would be met. Forest-Wide Standards state:

101. Harvest timber from slopes that are less than 35% using ground skidding equipment and from slopes greater than 35% using cable or aerial systems. Approve exceptions through the environmental analysis process, including a logging feasibility analysis.

125. Evaluate the potential for soil displacement, compaction, puddling, mass wasting, and surface soil erosion for all ground-disturbing activities.

126. The total acreage of all detrimental soil conditions shall not exceed 20% of the total acreage within any activity area, including landing and system roads. Consider restoration treatments if detrimental conditions are present on 20% or more of the activity area. Detrimental soil conditions include compaction, puddling, displacement, severely burned soil, and surface erosion.

127. Meet minimum percent ground cover levels following management activities (Table S-1).

Table S-1.-Minimum Percent Effective Ground Cover Following Land Management Activities:

| Soil Erodibility | First Year % | Second Year % |
|------------------------------------|-------------------------|--------------------------|
| Very High | 60-75 | 75-90 |
| High | 50-60 | 65-75 |
| Between Moderate & High | 45 | 60 |
| Moderate | 38 | 50 |
| Between Low & Moderate | 30 | 40 |
| Low | 20 | 30 |

128. Seed all disturbed soil occurring within 100 to 200 feet of a stream or areas further than 200 feet that could erode into a stream.

129. Seed all skid trails positioned on slopes greater than 20%.

These standards are appropriate for soils found in the project area and will maintain soils to meet appropriate guidelines.

Analysis Method

A Malheur National Forest Soils Scientist trained technicians to collect data on existing soil conditions. Soil conditions were categorized using *Soil Class Disturbance Definitions, and Assessment Data Forms*. They inspected the forested areas (including proposed harvest units) that burned to inventory detrimental impacts. All areas of proposed harvest areas were inventoried. Regeneration units from the last 20 years were not considered as no future ground disturbance is planned. Quantitative data was collected on transects.¹⁵ Areas logged within the last 30 years, and areas experiencing 10% or more detrimental impacts were included in the analysis. Field reviews during the process of inventorying sites verified that protocol was being followed consistently and procedures are replicable. Variability of examiners occurred in areas of higher rock content. During the process, field crews often worked in pairs to field verify each other's data for consistency and provide quality information.

The Malheur Soil Resource Inventory (SRI) was used to provide general baseline soil and land type information for the project area. Overall, identified groupings proved accurate. Variability was found in some sites due to topography, aspect and current vegetative occurrences. The largest inconsistency occurred on soils described as non-forested. These soils types have areas of non-forested and forested stands. The project soils specialist has formed judgments on the probable qualitative effects. Judgment is based on forest monitoring results obtained by a local Soil Scientist, personal observation¹⁶, scientific literature, the Malheur Land and Resource Management Plan (Forest Plan) Environmental Impact Statement and professional contacts.

¹⁵ Data collection methods were based upon protocol identified in the Monument Project file. Roads and landings were excluded from analysis.

¹⁶ Personal observation includes observation of Monument Fire and similar areas.

Project specific fire severity mapping was completed for the Monument fire area.¹⁷ Ground verification for soil conditions was considered necessary as photos represent burning of the vegetation. Substantial correlation between this evaluation and ground condition was established. Soil conditions differed in various stands and were dependent on the preceding vegetative occurrence. Fire severity mapping was used extensively during proposed action development and is referenced in proposed action descriptions. BAER evaluation from satellite data was originally used, but was found to understate severity in many areas. This same severity mapping is also used to predict forest vegetation mortality.

Identified spatial boundaries for soil effects are proposed unit boundaries by alternative, or boundaries of past sales. Unless otherwise stated, potential harvest effects are described for 1 to 2 years following proposed activities. It is during this time period that the potential for soil movement and erosion is greatest due to minimal ground cover and exposure to weather events.

Affected Environment

Topography

The project area is located generally on the western slope of the Table/Monument Rock fault block. Elevation varies from about 4,700 feet on the Little Malheur River to 7,873 feet at Bull Run Rock. Streams on the Malheur National Forest portion flow generally southerly in direction, emptying into the North Fork Malheur River. Precipitation in the area ranges from 22 to 44 inches.

Geology

Varied volcanic deposits are located throughout the area. Strawberry volcanic formations¹⁸ and andesite can also be found. Rock of this type erupted from numerous vents located near Strawberry and Lookout mountains.

Clarno formation deposits are generally located in the southeastern portion in the Camp Creek area, and consist of clastic and andesite flows. Ash surface soils are located on the low slope gradient areas of the Little Malheur River and in the headwaters of Spring, Flat, and Fopian Creeks. Alluvium deposits are located along the lower reaches of the Little Malheur River.

Within the project area, Clarno soils are considered the most sensitive soils to erosion. SRI surface erosion is rated as high to very high, especially when humus is removed by a fire event. These areas should be avoided with ground-based equipment, as this would only increase the potential for surface erosion.

Soil Management Types

The four major SRI management recommendation groupings within the project area included the following:

¹⁷ This mapping was completed using a combination of aerial photos of the Monument fire and ground verification.

¹⁸ These formations are identified by medium to pale gray colored basalt

Loamy and Clayey Soils (Nonforested)

4% of Project Area

Soils in this group are loamy and clayey soils with very limited plant available water. These soils are generally less than 15 inches deep. This supports only discontinuous vegetative ground cover, leaving part of soil surface vulnerable to erosional processes. Pavement areas¹⁹ develop where finer soils particles have eroded away exposing the courser rock fragments at the surface level. Ground disturbances that remove ground cover could cause unacceptable erosion. This is also true in pavement areas, and areas where channelized water occurs.

The surface erosion potential hazard generally is high to very high in these soil types.

Loamy Forested Soils

5% of Project Area

Soils in this group have high potential for accelerated sheet and rill erosion on slopes greater than 30 percent. These soils are generally more than 12 inches deep. Erosion can also occur if high intensity rainfall or runoff occurs. The moderate infiltration rate increases the amount of runoff water available for overland flow. If water is allowed to concentrate or is discharged onto bare soils, this condition becomes severe. It is important that erosion control practices be used following harvest, and maintained for each ongoing activity until sufficient vegetation is in place.

The surface erosion potential hazard is generally low to high dependant on vegetative cover for these soil conditions.

Forest Clayey Soils

1% of Project Area

Clayey soils have characteristics that create a high detrimental compaction hazard. Clayey soils are easily compacted over a wide and variable soil moisture range. Puddling occurs during excessively wet periods that result in damaged or destroyed soil structure.

Clayey soils are generally quite resistant to surface erosion, however erosion potential increases when litter and vegetation is removed. Excessive erosion can occur when water is concentrated and allowed to channel.

The surface erosion potential hazard is generally low to high, with high ratings on slopes greater than 30 percent.

Volcanic Ash Soils

52% of Project Area

Ash soils have low bulk density. Soil particles are easily detached; have a high water infiltration rate; high water holding capacity; and are very resistant to compaction. Characteristics of low bulk density allow for easy movement (displacement) of the soil by mechanical treatment. Soil detachability increases erosion potential by water and wind. For these soils, high infiltration and water holding capacity decreases erodibility by holding water in place.

Ash soils are vulnerable to mixing, displacement, and dustiness. Moisture content can increase or decrease the effects of management. Ideal moisture content range for logging,

¹⁹ areas of hard impervious material

livestock trailing and vehicle traffic is between 10 and 35 percent moisture by weight. Moistures below 10 percent result in excessive mixing, displacement, and dust. Moistures exceeding 35 percent are too wet to support intensive activities.

Surface erosion potential hazard for ash soils is low to medium in volcanic ash soils.

Complexes of 2 or More Soil Types

38% of Project Area

Complexes of soils types included in the four major management types also occur within the project area. These complexes include loamy clayey nonforested/loamy forested 25% and loamy clayey non-forested/ash 13%, which are defined as two or more soil mapping types found in an arrangement too small to separate at the scale the SRI represents.

Sensitive soil types in the planning area include highly and very highly erodible, shallow, rocky soils supporting low amounts of ground cover. Shallow soils hold about 0.5 to 1.8 inches of available water and support juniper woodlands or non-forest vegetation, and thus are unsuitable for (or limit) timber production. Shallow highly erodible soils are present in several areas in the fire area, with a large presence in the Camp Creek area and near the mouth of South Bull Run Creek.

Among forested soils, the most sensitive are those with both 1) slopes greater than 30% and 2) little or no volcanic ash at the surface ("non-ash soils"). These soils have an erodibility hazard between moderate and very high. Non-ash soils are mostly gravelly loam, loams, and clays holding 2-2.5 inches available water and they typically support ponderosa pine. Soil that has substantial amounts of volcanic ash (6 inches or more) are less erodible than non-ash soil because of the water holding capacity of ash, permitting more rapid plant growth and ground cover establishment. In addition, ash soil has a high porosity and little clay, so it has a high infiltration rate. In areas of severely burned vegetation, ash soils tend to be more hydrophobic, but recover quickly. Ash soils typically hold 3 to 5.5 inches available water and support mixed conifers.

Post Fire Soil Conditions

Fire severity delineation was completed from aerial photos of the project area. Vegetative burn severity delineation (refined from BAER) is used to display potential soil severity effects of the fire (see figure 3, Map Section). Table S-2 depicts acreage by vegetative burn severity within the fire area. In the Monument Fire area, ground cover was reduced below 50% in many areas that experienced low vegetative burn severity. Ground cover was completely consumed in many areas that experienced moderate vegetative burn severity. Ground cover was generally consumed over the entire area that experienced high vegetative burn severity.

Using BAER soil burn definitions, moderate and high vegetative burn severity areas would be classified as "High" soil burn severity areas with less than 20% ground cover remaining after the fire. In areas mapped as moderate vegetative burn severity, ground cover will not increase quickly, because fewer live needles remain and less ground vegetation will sprout. Areas mapped as moderate vegetative burn severity were treated similarly to areas mapped as high vegetative burn severity for this analysis.

Majority of low vegetative burn areas would be classified as "Moderate" soil burn severity areas with 20-50% ground cover remaining. In areas mapped as low vegetative burn severity, many trees that are expected to die remain with live or dead needles and ground cover will

increase as needles fall to the ground. Overall, ground cover in the fire area will likely exceed 30% by the summer of 2004 due to litter fall and increases in herbaceous vegetation.

Table S-2: Vegetative Burn Severity by Subwatershed

| Subwatershed | Total Acres (USFS Acres) | Low or Partial Severity Acres | Moderate Severity Acres | High Severity Acres | Total Burned# Acres | % of SWS Burned |
|----------------------|--------------------------|-------------------------------|-------------------------|---------------------|---------------------|-----------------|
| Swamp Cr | 25,600 | 283 | 734 | 274 | 1,291 | 5 |
| Upper Little Malheur | 31,474 | 1,895 | 5504 | 11,490 | 18,889 | 60 |

Many areas do not meet Forest Plan standards for ground cover and are at risk for soil erosion with as low as 5% to 10% ground cover found in areas of moderate to high burn severity. The BAER Team approximated 5 to 15% of acres within the Monument Fire area are high in hydrophobicity.

Fire lines constructed with dozers during fire suppression activities resulted in displacement and compaction of soils. These lines were rehabilitated in 2002. Detrimental effects to soils from these activities²⁰ were found to be less than 1% of the project area.

Sensitive Surface Erosion Conditions in Harvest Units

Surface erosion ratings are derived from the SRI description (see figure 18, Map Section). The rating is based on expected loss of soil when all vegetative cover is removed. Post fire surveys indicated only 10-15% of ground cover remained in most areas, creating similar conditions for surface erosion potential. Several rain events after the fire resulted in surface erosion in the areas rated as high and very high in the SRI. Surface erosion potential varies widely in the project area. When describing surface erosion potential, the highest threat of soil loss²¹ is displayed first where a range of erosion potentials are present. For example, a harvest unit with a High - Low rating indicates the presence of both hazard conditions in that represented area.

Soil Productivity

Biotic Conditions

Soil productivity is limited by low amounts of water, by cold temperatures, and perhaps by insufficient nutrients, especially nitrogen. Fire usually decreases the amount of nitrogen on the land.²² In the absence of fire, nitrogen increases.²³ Before the Monument Fire, significant fires had not burned in the area for many decades thus resulting in a build up of nitrogen levels. Accumulated levels of nitrogen were likely higher than levels in the 1800s, (before fire suppression practices came into play). Some of the nitrogen built up over the decades was lost during the Monument fire. However, in lightly burned areas there is

²⁰ measured during the soil disturbance surveys

²¹ the most restrictive for planning

²² Easily available nitrogen often increases for one to a few years

²³ Nitrogen from the atmosphere accumulates in the organic matter of biomass, forest floor, and soil, especially due to the fixation of nitrogen by plants such as *Ceanothus*.

probably more nitrogen present in the soil compared to levels during the pre-fire suppression era. More nitrogen was lost from severely burned areas, but the amount of loss is unknown.

Organic material in the form of coarse woody material (CWM) is needed for long-term soil productivity. Current research recommends retention of 5-10 tons/acre on dry ponderosa pine and Douglas fir types (Brown et al., 2003). The adjacent Wallowa-Whitman National Forest recommends 5-10 tons/acre for ponderosa pine sites and 7-15 ton/acre for mixed conifer sites (Tim Bliss/ Soil Scientist, personal communication).

Food Web

Moisture retention in CWM is important for maintaining the productivity of soil (Amaranthus, et al. 1989). Decaying material needed to support organisms and return nutrients to the soil will be formed as standing dead trees in the project area fall and come into contact with the ground. Woody plants depend on ectomycorrhizae for water and nutrient up take. Harvey et al. (1979) found ectomycorrhizae in decaying wood in higher numbers than in the soil alone. Moisture content in adjoining soils will also remain at elevated levels and provide areas of accelerated vegetative recovery.

Water retained in woody material is not available for augmenting late-season stream flows. The droughty conditions present in the project area prevent the moisture stored in decaying wood to augment stream flows, but would provide moist micro-sites for conifers and other vegetation.

Mycorrhizae form symbiotic communities with the roots of conifers and are important in aiding nutrient uptake, water uptake and in warding off pathogenic fungi. Mycorrhizal fungal communities and other soil microbes are important not only because of their role in nutrient production and transfer, but also because of their contribution to soil formation and structure.²⁴ Stability of soil aggregates is important for maintenance of soil pores that transmit air and water to plant roots (Amaranthus et al., 1989). Mycorrhizae populations are expected to decrease within the Monument area as result of the fire. Highest decreases in mycorrhizae populations would occur were burn severities were the highest.

Many other organisms are import for soil formation, fertility, and nutrient recycling. The soil horizons generally affected are the organic litter and duff layer, and the "A" horizon where carbon and nitrogen are stored and recycled. Organisms that influence soils include viruses, archaea, bacteria and blue-green algae, protozoa, fungi, molds and lichens, mosses and liverworts, all types of vascular plants (shrubs, trees, herbs); and various animals such as nematodes, snails, earthworms, and burrowing animals.

Detrimental Soil Conditions

Each proposed unit was surveyed for impacts from past logging, road building, wildfire, and fire suppression activities. Table S-3 displays results of surveyed transects, site visits, and GIS analysis.

²⁴ Mycorrhizae and free-living fungi produce compounds derived from humus that accelerate decomposition of primary minerals and secrete substances serving as organic glue to bind soil particles into water-stable aggregates.

Table S-3. Existing Detrimental Soil Conditions by Proposed Treatment Unit

| Proposed Timber Harvest Unit | Unit Acres | Existing Detrimental Soil Conditions from Past Management Activities and the Monument Fire (%) | | | |
|------------------------------|------------|--|-------------|--------------|-------|
| | | Roads | Skid Trails | Fire Effects | Total |
| 1 - T | 66 | 4 | 0 | 1 | 5 |
| 2 - T | 11 | 4 | 0 | 1 | 5 |
| 3 - T | 12 | 5 | 0 | 2 | 7 |
| 4 - T | 20 | 4 | 0 | 1 | 5 |
| 5 - T | 41 | 3 | 0 | 1 | 4 |
| 6 - T | 40 | 2 | 0 | 1 | 3 |
| 8 - T | 28 | 1 | 0 | 1 | 2 |
| 9 - T | 8 | 3 | 0 | 0 | 3 |
| 10 - T | 76 | 2 | 10 | 0 | 12 |
| 11 - T | 53 | 1 | 0 | 1 | 2 |
| 12 - T | 113 | 1 | 5 | 1 | 7 |
| 13 - H | 17 | 1 | 0 | 1 | 2 |
| 14 - H | 29 | 1 | 0 | 2 | 3 |
| 15 - H | 91 | 1 | 0 | 2 | 3 |
| 16 - H | 16 | 1 | 8 | 2 | 11 |
| 17 - H | 131 | 3 | 10 | 2 | 15 |
| 18 - H | 178 | 3 | 8 | 1 | 12 |
| 19 - H | 34 | 4 | 6 | 1 | 11 |
| 20 - H | 18 | 1 | 6 | 1 | 9 |
| 21 - H | 54 | 2 | 5 | 1 | 8 |
| 22 - H | 48 | 4 | 6 | 2 | 12 |
| 23 - H | 345 | 0 | 0 | 2 | 2 |
| 24 - H | 16 | 1 | 0 | 2 | 8 |
| 25 - H | 257 | 1 | 10 | 2 | 13 |
| 26 - H | 35 | 1 | 0 | 2 | 3 |
| 27 - H | 34 | 3 | 8 | 2 | 12 |
| 28 - H | 90 | 1 | 8 | 1 | 11 |
| 29 - H | 107 | 3 | 5 | 2 | 9 |
| 30 - H | 98 | 1 | 8 | 2 | 11 |
| 31 - H | 70 | 3 | 8 | 2 | 13 |
| 32 - H | 201 | 4 | 9 | 2 | 15 |
| 33 - H | 169 | 3 | 5 | 2 | 10 |

| Proposed Timber Harvest Unit | Unit Acres | Existing Detrimental Soil Conditions from Past Management Activities and the Monument Fire (%) | | | |
|------------------------------|------------|--|-------------|--------------|-------|
| | | Roads | Skid Trails | Fire Effects | Total |
| 34 - H | 316 | 1 | 6 | 2 | 8 |
| 35 - H | 486 | 3 | 5 | 2 | 10 |
| 36 - H | 73 | 2 | 5 | 1 | 8 |
| 37 - H | 76 | 4 | 6 | 1 | 11 |
| 39 - H | 42 | 1 | 8 | 1 | 8 |
| 40 - H | 184 | 5 | 0 | 2 | 7 |
| 41 - H | 216 | 7 | 0 | 2 | 9 |
| 42 - H | 24 | 3 | 5 | 1 | 9 |
| 43 - H | 29 | 1 | 6 | 2 | 9 |
| 44 - H | 13 | 1 | 1 | 1 | 3 |
| 45 - H | 19 | 1 | 10 | 1 | 12 |
| 46 - H | 17 | 3 | 10 | 2 | 15 |
| 47 - H | 9 | 3 | 5 | 2 | 10 |
| 48 - H | 16 | 3 | 5 | 2 | 10 |
| 49 - H | 21 | 4 | 5 | 1 | 10 |
| 51 - H | 29 | 1 | 5 | 1 | 7 |
| 52 - H | 24 | 9 | 3 | 2 | 14 |
| 53 - H | 37 | 3 | 3 | 1 | 7 |
| 54 - H | 37 | 0 | 8 | 2 | 10 |
| 55 - H | 26 | 1 | 0 | 1 | 2 |
| 57 - H | 40 | 3 | 6 | 1 | 10 |

The fire caused about 1 to 2 percent of soil in surveyed units to be detrimentally burned (Table S-3). Detrimentially burned soil was limited to areas around stumps and concentrations of slash or blow down. Areas of high vegetative burn severity contained the highest percentage of burnt soils. Also present were small amounts of displacement and compaction resulting from fire suppression activities generally located along fire lines constructed with dozers.

Areas where high and moderate fire severity occurred and effective ground cover was reduced to approximately 5% to 10% are considered to have high to very high surface erosion potential given the high clay content in these soils along with natural low vegetative cover. Detrimental surface erosion has occurred in portions of proposed units 24, 25, 28, 29, 35, 36, 37, and 41 located in the Camp Creek area following intense thunderstorms in the fall of 2002, during the spring melt off in 2003, and during an intense thunderstorm during the summer of 2003.

Soil types located in the project area within the Swamp Creek Subwatershed have ash soils or soil complexes with high ash content and have low erosion potential. Low slope angles further reduce the surface erosion potential level in these areas. Very little to no surface erosion has been witnessed in these ash soils areas following intense thunderstorms in the fall of 2002, during the spring melt off in 2003, and during an intense thunderstorm during the summer of 2003.

Mass Wasting

No recent landslides were mapped during post-fire soil surveys. Existing soil types found in the project area are generally considered stable, and are not prone to landslides or mass wasting. About 4 percent (150 acres) of the helicopter harvest units in Alternative 2 are rated as unstable or moderately stable in the SRI. Portions of unstable or moderately stable areas are located in units 23, 25, 26, 27, 29, and 40. All areas of tractor harvest are rated as very stable and are not prone to landslides or mass wasting.

Past Harvest Activities

Logging impacts to soils from previous timber sales are present on about 5,910 acres in the project area (Table S-4). Multiple entries have occurred on about 1,149 acres. Majority of previous timber sale were logged with ground-based systems, normally tractors, and occurred within the planning area twenty to forty years ago. In many cases, skidding and road construction occurred on steep slopes during harvest operations. However, current Malheur Plan standards for soil condition are being met (Table S-3).

Table S-4. Past Logging Entries in the Monument Project Area

| Subwatershed | All Entries (Acres) | Tractor Harvest (Acres) | One Entry (Acres) | Two Entries (Acres) |
|-------------------------------|------------------------|----------------------------|----------------------|------------------------|
| Swamp Creek | 407 | 407 | 388 | 19 |
| Upper Little Malheur River | 5,503 | 5,425 | 4,373 | 1,130 |

During past timber harvest projects roads and skid trails were also constructed in the draw bottoms of the Camp Creek area. An increase in the stream network has occurred in various places, with total channel interception causing multiple channels to be present in certain areas.

The majority of harvest prescribed in the Swamp Creek Subwatershed area is proposed in units that have never been previously harvested. Some use has occurred from woodcutting and use by equipment for adjacent harvest units.

Environmental Effects

Soil effects not described below are considered negligible. These negligible effects include effects on mass movement, effects on detrimentally burned soil, effects on soil microbes, and effects from vegetative plantings.

Alternatives - 1

Direct/Indirect Effects:

Soil Erosion

Soil erosion rates have increased following the 2002 fire due creation of hydrophobic soil layers, and consumption of ground cover and CWD. Surveys conducted during the Monument BAER review noted that highly hydrophobic soils were present in 10 to 15 percent of the high intensity burn within the Camp Creek and Little Malheur River areas. Average ground cover was reduced to 5 to 10% in high severity burned areas. Majority of CWD in the project area was consumed during the fire.

As noted in the aquatics report, WEPP (Elliott et al., 2000) derived numbers estimated the potential for significant soil loss during heavy rainfall or melt off events. Typically, erosion after a fire is highest the first year and returns to pre-fire conditions in four years. WEPP was used to estimate soil loss during the first 1 to 3 years following the wildfire. Soil loss of 7.5 to 17 tons/acres is possible on the steep slopes of the Monument area. This equates to about 0.01 to 0.15 inches of topsoil and will result in a fertility loss of about 3 to 5 percent in some areas. See aquatics section for detailed information on sediment effects to water quality and aquatic habitat.

Water repellency will rapidly decrease under natural conditions, with more than 50% of repellency disappearing before the summer of 2003 (Robert McNeil/ Soil Scientist, Personal communication), and returning to background levels by the summer of 2004 or 2005. Root action, animals that burrow in the soil, and freezing water will gradually loosen compacted soil over the course of decades.

Soil Productivity

No organic material or nutrients would be removed. With time, organic matter will gradually accumulate from the CWD, forbs, and grasses. Nutrients will gradually accumulate due to inputs (in precipitation, dry deposition, weathering of parent material, and nitrogen fixation) and retention. These processes will take decades.

Retention of all dead and dying trees will create elevated fuel levels (see Fire/ Fuels Specialist Report) and may create a problem in the future. Soils may be detrimentally burned if another fire occurs as logs are consumed at ground level. Additional soil would be eroded and nutrients and organic matter lost. Productivity loss is difficult to predict at this time. Future wildfire has the potential for detrimental burning effects to the soil resource.

The Alternative 1 would have no effect on ectomycorrhizae or other beneficial fungi or organisms in this area. Ectomycorrhizae are most abundant in the organic soil components, including the litter, humus; soil wood, charcoal and organic enriched mineral horizons. Since the Monument fire reduced the soil organic component, it follows that the total number of ectomycorrhizae would be reduced. This occurs for a number of reasons including the reduction of habitat sites, chemical changes in the remaining organic matter and the reduction of conifer needs for the added nutrient uptake capacity gained through ectomycorrhizal associations. Soil chemistry can change after fire, resulting in unfavorable conditions for some ectomycorrhizae species. Prescribed fire has been observed to decrease ectomycorrhizae activity for up to four years. However, it should be noted that ectomycorrhizae are abundant in charcoal incorporated into the soil and the habitat sites provided by burning may compensated for the in initial population reductions.

Cumulative Effects

Soil Erosion

All of the past, ongoing, and reasonable foreseeable future activities identified in the beginning of Chapter 3 have been considered for their cumulative effects on soil resources. The following discussion focuses on those activities that may contribute negative or positive effects.

Decommissioning of roads and obliteration of old skid trails from past harvest activities would not occur. Erosion from these sources would continue at baseline levels. Short-term increases from road treatments would not occur. Existing erosion from substandard roads would persist because drainage and erosion improvements on the open road system would not occur.

Livestock grazing beginning as early as 2005 is foreseeable in the fire area if requirements of the Malheur Post Fire Grazing Guidelines are met. Livestock grazing can result in the reduction of ground cover soil displacement during dry and wet periods, and soil compaction during wet periods. Therefore, livestock grazing may delay the recovery of erosion rates to pre-fire levels.

Soil Productivity

Large organic matter levels would continue to increase as trees die and as weather related processes (windthrow, snow, etc.) recruit large wood to the forest floor. Within the severely burned areas, large organic matter levels will increase as fire killed trees fall to the forest floor. Fine organic matter levels will increase in response to revegetation of the area with grasses, shrubs, and young trees. As organic matter accumulates on the ground and decomposes, nutrient levels will increase.

Alternatives 2, 3, and 4

Direct and Indirect Effects

Soil Erosion

Ground skidding

When contemplating long-term effects to soils, ground disturbance from machinery is the most significant factor to consider. Ground based harvest activities can result in compaction and displacement of soils. The use of tractor harvest within wildfire areas has the most potential for unacceptable effects to soil resources (Beschta et al. 1995).

Displacement will decrease soil productivity. Removal of the top layer of soil and loss of productivity can last for years. Design measures will reduce impacts substantially, but cannot eliminate effects. Displacement occurs at landings and temporary road locations.

Tractor skidding causes compaction with as few as one to two passes. Compaction usually lasts more than 20 years. Some compaction remains for more than 50 years.

Tractor harvest will decrease existing vegetative ground cover as skidding and harvesting occurs. Ground cover on skid trails will be decreased, especially in areas of high fire severity. Harvest will add additional ground cover from slash throughout the treatment areas and can serve as a base to distribute weight and lessen compaction from machinery.

Skidding on slopes greater than 35% or unsuitable lands may cause displacement and will not be allowed. Skidding also creates areas of bare soil, decreases infiltration, and channels overland flow, and thus accelerates erosion, especially on steep slopes and non-forested land.

Seeding of skid trails is required by the Forest Plan on steeper slopes of 20% or greater. Slopes throughout the tractor harvest portion of the project area are less than 20% on average. Soil monitoring conducted on skidding operations after two and three years after the Summit Fire on the Malheur National Forest, demonstrated that skidding caused export of a total of 0.02 m³ of sediment from units totaling 230 acres (McNeil 2001). This is an insignificant amount and close to baseline levels.

Potential soil erosion in the project area is related to site-specific fire severity, soil type, average unit slope, surface erosion potential, and compaction information on tractor units (Table S-5):

Table S-5. Erosion Potential Tractor Harvest Units Alternative 2

| Unit | Average Slope | Soil Type | Fire Severity | Acres | Surface Erosion Potential | Compaction Potential |
|------|---------------|----------------|---------------|-------|---------------------------|----------------------|
| 1 | 10 | Ash | Light | 4 | L | M |
| | | Loam Clay/Ash* | Light | 1 | M-H | M-L |
| | | Ash | Moderate | 16 | L | M |
| | | Loam Clay/Ash* | Moderate | 4 | M-H | M-L |
| | | Ash | Severe | 33 | L | M |
| | | Loam Clay/Ash* | Severe | 8 | M-H | M-L |
| 2 | 7 | Ash | Moderate | 7 | L | M |
| | | Loam Clay/Ash* | Moderate | 4 | M-H | M-L |
| 3 | 10 | Ash | Light | 12 | L | M |
| 4 | 20 | Ash | Light | 6 | L | M |
| | | Loam Clay/Ash* | Light | 14 | M-H | L-M |
| 5 | 12 | Ash | Light | 2 | L | M |
| | | Ash | Severe | 39 | L | M |
| 6 | 12 | Ash | Moderate | 31 | L | M |
| | | Loam Clay/Ash* | Moderate | 4 | M-H | M-L |
| | | Ash | Severe | 5 | L | M |
| 8 | 13 | Ash | Moderate | 28 | L | M |
| 9 | 12 | Loam Clay/Ash* | Moderate | 1 | L | M |
| | | Loam Clay/Ash* | Moderate | 7 | M-H | M-L |

| Unit | Average Slope | Soil Type | Fire Severity | Acres | Surface Erosion Potential | Compaction Potential |
|------|---------------|----------------|---------------|-------|---------------------------|----------------------|
| 10 | 10 | Ash | Light | 1 | L | M |
| | | Ash | Moderate | 75 | L | M |
| 11 | 10 | Ash | Moderate | 16 | L | M |
| | | Ash | Severe | 37 | L | M |
| 12 | 11 | Ash | Moderate | 110 | L | M |
| | | Loam Clay/Ash* | Moderate | 3 | M-H | L-M |
| 55 | 7 | Ash | Moderate | 4 | L | M |
| | | Loam Clay/Ash* | Moderate | 14 | M-H | L-M |
| | | Ash | Severe | 3 | L | M |
| | | Loam Clay/Ash* | Severe | 5 | M-H | L-M |

*Loamy Clayey Non-Forested (complex)

Skid trails used for the salvage of material will occupy about 10% to 14% of each unit. Skid trails are typically spaced at 100 to 120 feet apart.²⁵ Probable detrimental soil conditions (DSCs) from compaction would increase by 6% (on dry soil) to 11% (on moist soil) on tractor units due to skidding.²⁶ The amount of compaction depends much more on soil moisture than on soil type. If a unit were harvested over snow or on deeply frozen soil, compaction would be about 0.5%. Use of feller-bunchers would increase detrimental impacts by an additional 1% to 2% (McNeil, 1996). Design elements restricting skidding on wet soil would keep compaction²⁷ to a minimum. Mitigation in the form of subsoiling can reduce compaction, but does nothing about displacement.

Subsoiling is feasible when soil depths are 12 to 24 inches in depth. Soils with high rock content usually are not subsoiled. Subsoiling is recommended on skidtrails and landings in all units that are tractor harvested unless activities occur on frozen or snow-covered ground. Skid trails will be evaluated after harvest before treatment. Tractor-logging units in the Monument Project have ash surface soils or are made up of a complex that includes a high percentage of ash. Ash soils are more resistant to compaction under proper soil moistures than are residual soils in the area. Caution is used when prescribing subsoiling because subsoiling: 1) bares soil, 2) forms channels, 3) makes soil particles more easily detachable, and 4) disrupts roots. Thus, subsoiling raises the risk of erosion for a few years. Subsoiling can cause mixing of the soil horizons if improper equipment is used, and implemented incorrectly. However, subsoiling also increases infiltration, which decreases long-term risks

²⁵ includes skidding patterns near landings

²⁶ Detrimental soil conditions would increase because skidtrails usually are about 50% to 80% compacted, and because existing skidtrails would be re-used where they were appropriately located.

²⁷ The 80% compaction level was used for computation of DSC's for the tractor units in this project.

of erosion. This increased infiltration together with subsoiling design elements, means sediment production from erosion due to subsoiling would be negligible. Machinery used for subsoiling must be cleansed offsite to prevent noxious weeds from entering the area. This procedure would be required for all ground base machinery including loaders and log trucks working at landings.

Subsoiling and resultant amelioration of the compaction will increase infiltration and reduce potential surface erosion. Tractor harvest and skidding will leave about 5-7% of the area affected. About 50% of the total DSCs created by harvest activities will be reduce by subsoiling.

Implementation of design features and site-specific BMPs; such as designated skid trails, seasonal restrictions, use of low ground pressure logging equipment and rehabilitation of landings and skid trails; total additional detrimental impacts range from 5 to 7 percent above existing DSC levels. Therefore, overall impacts from ground skidding activities will likely range from 7 to 14 percent in most tractor units. For unit 10, additional mitigation measures will be used to limit additional impacts to 2 to 4 percent above existing DSC levels. These measures will result in total DSC in unit 10 ranging from 14 to 16 percent. Predicted detrimental effects are expected to leave the tractor harvest areas below the 20% standard as required by the Forest Plan (Table S-6).

Table S-6. Predicted Total Disturbed Soil Conditions Following Tractor Harvest Under Alternatives 2, 3, and 4. Note: Units 10 and 12 will not be logged under Alternative 3. Assumes use of feller-bunchers, and dry or moist ground conditions.

| Proposed Timber Harvest Unit | Unit Acres | Existing DSC (% of Unit Area) | Total DSC (% of Unit Area) |
|------------------------------|------------|-------------------------------|----------------------------|
| 1 - T | 66 | 5 | 10 - 12 |
| 2 - T | 11 | 5 | 10 - 12 |
| 3 - T | 12 | 7 | 12 - 14 |
| 4 - T | 20 | 5 | 10 - 12 |
| 5 - T | 41 | 4 | 9 - 11 |
| 6 - T | 40 | 3 | 8 - 10 |
| 8 - T | 28 | 2 | 7 - 9 |
| 9 - T | 8 | 3 | 8 - 10 |
| 10 - T | 76 | 12 | 14 - 16 |
| 11 - T | 53 | 2 | 7 - 9 |
| 12 - T | 113 | 7 | 12 - 14 |
| 55 - T | 26 | 2 | 7 - 9 |

Helicopter harvest

For Alternatives 2, 3 and 4, helicopter yarding will be used for log removal on all harvest areas within the Upper Little Malheur Subwatershed. Potential DSC increases include compaction and displacement from the felling operation. Affected would be small and are considered insignificant. Measurements from past helicopter logging operations have

indicated that up to 12 percent of the ground surface in any one area can be disturbed by felling and yarding operations (Klock & Glen, 1975). Of this disturbance, less than 1 percent was considered severe or excessive. This amount of disturbance will not be considered as a detrimental impact according to Forest Standards. Increases in DSC will occur in some helicopter units due to the construction of landings and temporary access roads. Predicted detrimental effects are expected to leave the helicopter harvest areas below the 20% standard as required by the Forest Plan (Table S-7).

Table S-7. Predicted Total Disturbed Soil Conditions Following Helicopter Harvest Under Alternatives 2, 3, and 4.

| Proposed Timber Harvest Unit | Unit Acres | Existing DSC (% of Unit Area) | Alternative 2 | Alternative 3 | Alternative 4 | Total DSC (% of Unit Area) |
|------------------------------|------------|-------------------------------|---------------|---------------|---------------|----------------------------|
| 13 - H | 17 | 2 | Harvested | Harvested | Harvested | 2 |
| 14 - H | 29 | 3 | Harvested | Harvested | Harvested | 5 |
| 15 - H | 91 | 3 | Harvested | Harvested | Harvested | 3 |
| 16 - H | 16 | 11 | Harvested | | Harvested | 11 |
| 17 - H | 131 | 15 | Harvested | | Harvested | 16 |
| 18 - H | 178 | 12 | Harvested | | Harvested | 13 |
| 19 - H | 34 | 11 | Harvested | | Harvested | 11 |
| 20 - H | 18 | 9 | Harvested | Harvested | Harvested | 9 |
| 21 - H | 54 | 8 | Harvested | Harvested | Harvested | 8 |
| 22 - H | 48 | 12 | Harvested | | Harvested | 13 |
| 23 - H | 345 | 2 | Harvested | Harvested | Harvested | 2 |
| 24 - H | 16 | 8 | Harvested | Harvested | Harvested | 10 |
| 25 - H | 257 | 13 | Harvested | Harvested | Harvested | 14 |
| 26 - H | 35 | 3 | Harvested | Harvested | Harvested | 3 |
| 27 - H | 34 | 12 | Harvested | | Harvested | 12 |
| 28 - H | 90 | 11 | Harvested | Harvested | | 11 |
| 29 - H | 107 | 9 | Harvested | Harvested | Harvested | 11 |
| 30 - H | 98 | 11 | Harvested | Harvested | Harvested | 11 |
| 31 - H | 70 | 13 | Harvested | Harvested | Harvested | 14 |
| 32 - H | 201 | 15 | Harvested | Harvested | Harvested | 16 |
| 33 - H | 169 | 10 | Harvested | Harvested | Harvested | 10 |
| 34 - H | 316 | 8 | Harvested | Harvested | Harvested | 10 |
| 35 - H | 486 | 10 | Harvested | Harvested | Harvested | 11 |
| 36 - H | 73 | 8 | Harvested | Harvested | | 8 |
| 37 - H | 76 | 11 | Harvested | Harvested | Harvested | 13 |

| Proposed Timber Harvest Unit | Unit Acres | Existing DSC (% of Unit Area) | Alternative 2 | Alternative 3 | Alternative 4 | Total DSC (% of Unit Area) |
|------------------------------|------------|-------------------------------|---------------|---------------|---------------|----------------------------|
| 39 - H | 42 | 8 | Harvested | | | 8 |
| 40 - H | 184 | 7 | Harvested | | | 9 |
| 41 - H | 216 | 9 | Harvested | | | 9 |
| 42 - H | 24 | 9 | Harvested | | | 9 |
| 43 - H | 29 | 9 | Harvested | | | 9 |
| 44 - H | 13 | 3 | Harvested | | | 3 |
| 45 - H | 19 | 12 | Harvested | | | 12 |
| 46 - H | 17 | 15 | Harvested | | | 15 |
| 47 - H | 9 | 10 | Harvested | | | 10 |
| 48 - H | 16 | 10 | Harvested | | | 10 |
| 49 - H | 21 | 10 | Harvested | | | 10 |
| 51 - H | 29 | 7 | Harvested | | | 7 |
| 52 - H | 24 | 14 | Harvested | | | 14 |
| 53 - H | 37 | 7 | Harvested | Harvested | Harvested | 7 |
| 54 - H | 37 | 10 | Harvested | Harvested | Harvested | 10 |
| 57 - H | 40 | 10 | Harvested | | Harvested | 10 |

In areas of harvest, increases in down woody material, and subsequent reduction in the amount of surface erosion is expected. Tops, branches, and boles remaining on site and making contact with the ground can trap sediment retaining it on slope. Ground cover is expected to increase 10% or more from logging slash. Areas of high to very high surface erosion located in the Camp Creek and Little Malheur River areas will be logged. Woody debris remaining from logging will decrease surface erosion and accelerate nutrient return.

Alternatives 3 and 4 have no harvest along RHCA areas. Alternative 3 includes additional buffers added to RHCAs to lessen potential sediment. Alternative 4 includes the standard RHCA buffer size. Effect to soils from these changes would be the reduction of a needed landing and associated construction effects. Actual ground disturbance reductions will not be discernible owing to limited impacts from this type of activity.

Not harvesting in the RHCA and additional buffers could have detrimental soil burning consequences in the future. Fuel levels will be above the historic range and areas with down material could cause detrimental soil damage.

Temporary Road Construction and Landings

Decrease in soil productivity from construction of temporary roads and landings can be expected. Productivity would increase and DSC will decrease when these areas are sub-soiled, but will not return to reference conditions for many years. Seeding will occur at all landings.

Twenty landings will be constructed to land and process material. Landings are approximately one acre in size. DSC increases from displacement and compaction will occur at each landing. DSCs from displacement will occur and take years to recover. Landings used for ground based skidding have lower displacement problems and return to reference conditions rapidly.

Temporary road construction would reduce or eliminate productivity of affected areas during active use. Obliteration of temporary roads subsequent to use should return productivity to near original levels unless topsoil displacement is excessive.

Fuel treatments

Effects of this Alternative would be similar to effects under the No Action Alternative. The main differences are as follows:

No machine piling will be allowed to protect soils; whole tree yarding will be used in the tractor logged resiliency stands. Lop and scattering of slash will be done as needed.

Hand piles will treat fuels in one unit within the RHCA along the Little Malheur River. Burning piles will cause a DSC increase of approximately 1% to 2% caused by burning of the piles.

Landing slash will be piled and burned. Soils where landing slash is burned will be detrimentally impacted by high intensity heat over an extended period.. Helicopter landings are located in upland areas with flat terrain and low sedimentation risk. All landing will be seeded to stabilize soils. .

Soil Productivity

Logging will remove nutrients and organic matter from the units. This removal may decrease site productivity on some sites. Generally, removal of nutrients or organic matter does not limit productivity. In addition, relatively small amounts of nutrients will be removed due to harvest plans and snag retention.²⁸ See the Fire/ Fuels section for estimates pertaining to the amount of fuels that would remain on site.

Projected CWM amounts throughout the project area have been estimated to meet or exceed the minimum amounts of material needed for long time productivity. For Alternatives 2 and 4, about 7 tons/acre will remain in upland harvest units of the Little Malheur River, and about 9 tons/acre in upland harvest units of the Swamp Creek Subwatershed. Alternative 3 retains about 14 tons/acre in upland units. Alternative 2 harvest activities will lower CWM to 50 tons/acre in the Camp Creek RHCA areas. Combining harvest and hand piling of CWM, about 26 tons/acre will remain along the Little Malheur River. These levels of CWD meet the recommendations for their respective forest types (see affected environment discussion for productivity).

Salvage prescriptions that leave all live trees and down woody material are expected to maintain ectomycorrhizae populations over the project area. Soil organisms will be reduced in areas where equipment used for ground skidding, landing construction and operation, and subsoiling impacts the soil. This effect cannot be avoided when using ground based harvest methods. Pile burning will also affect soil organisms in localized areas where soil is sterilized from high intensity heat.

²⁸ This is the case because wood has a low concentration of nutrients, and because some trees retained for wildlife are not merchantable and are being retained in the draws.

Road Management

Road reconstruction proposals would tend to increase productivity somewhat over the long-term as risk of road failure is reduced and drainage improved. Increased resistance to storm damage and improved water management would reduce the possibility of soil loss at or adjacent (downhill) to the reconstructed sections.

Over the long-term, road obliteration treatments would increase productivity as previously dedicated roadbeds and cut-and-fill areas become more hospitable to plant growth. No short-term loss of productivity is expected. No measurable increase in surface erosion is expected and stabilization will occur rapidly (1 to 3 years). Obliteration activities will allow for vegetative growth in areas where roadbeds have lessened or prevented growth in the past. Expected infiltration increases, overland flow decrease, and re-sloped material would be better utilized as it is replaced on existing roadbeds.

Old Skid Trail Restoration and Road Obliteration

Short-term increases in sediment are possible in areas of old road treatments. Additional soils will be exposed as compacted material is loosened, and redistributed. Roads from this era were generally built to a lower standard than current construction requirements. Existing berms, and in-sloping channel runoff can cause additional soil loss. Culverts will be removed, and the channel put back to grade. Woody material sites associated with the berms will be utilized and placed on the former roads prism. This material, along with mulching and seeding will minimize short-term soil runoff and should eliminate it long-term.

Cumulative Effects

All of the past, ongoing, and reasonable foreseeable future activities identified in the beginning of Chapter 3 have been considered for cumulative effects on soil resources. The following discussion focuses on those activities that may contribute negative or positive effects. In general, the scale of the fire will elevate the sensitivity of the Little Malheur subwatershed to all ground disturbing activities.

Soil Erosion

Road obliteration and rehabilitation of old skid trails from past harvest activities would occur. Erosion from these sources would be reduced from baseline levels. Existing erosion risk from roads proposed for reconstruction would be reduced as any active erosion from as rills or gullies would be removed.

Resumption of grazing after two or more growing years would increase levels of compaction in riparian areas containing new sediment deposits associated with first and second year soil runoff. Bank development and sediment retention will be reduced even if current Forest Plan Standards are followed. Recovery of vegetation areas will be reduced as will potential residual vegetative matter. Recovery to baseline surface erosion may take longer than two years. These potential effects would occur in addition to activities planned in the alternatives within the RHCAs that have potential ground disturbance such as old skid trail obliteration and road maintenance.

Grazing could also potentially reduce ground cover and organic matter in upland areas where ground-disturbing activities are proposed. These activities include use of skid trails, obliteration old skid trails, construction of new landings and temporary roads, and roads decommissioned. This would delay vegetative recovery planned on these areas to stabilize the soil.

Resumption of grazing using the Malheur Post Fire Grazing Guidelines would be implemented so it would not violate ground cover standards or increase soil erosion, but care is needed in the areas of high to very high surface erosion potential located in the Little Malheur River Subwatershed portion of the project.

Soil Productivity

Reduction of fuel loading by salvage harvesting will lower potential fire spread in the near future. If a wildfire occurs, proposed harvest treatments would decrease fire severity and effects to soils (Vihnanek and Ottmar, 1993).

Alternative 5

Direct and Indirect Effects

Soil Erosion

Erosion rates will be similar to Alternative 1 as the result of no harvest and temporary road construction. No additional detrimental impacts would occur. Road maintenance activities will be conducted as planned under Alternatives 2, 3, and 4. Additional closures prescribed by this alternative carry potential to reduce erosion on native surface roads. Roads planned for closure must be monitored to assure proper drainage in the future. Previous management practices of road construction, skidding techniques, and general guidelines have caused additional impacts to soil resources and have had long-term consequences. Rehabilitation of these old roads and skid trails is planned to lessen long-term effects of increased runoff and sedimentation.

Soil loss from native surface roads will be reduced from the additional road closures as vegetation grows over wheel tracks and use is eliminated during wet periods.

Soil Productivity

No organic material or nutrients would be removed. Productivity of the soil will continue to increase as woody material falls to the ground. No additional detrimental impacts will occur from harvest related activities and temporary road construction. Effects to soil organisms and nutrients would be the same as Alternative 1.

Decommissioning of roads under this alternative is the same as Alternatives 2, 3, and 4. Addition closures will allow for a slow rate of natural recovery with removal of traffic on closed roads.

Cumulative Effects

All past, ongoing, and reasonable foreseeable future activities identified in the beginning of Chapter 3 have been considered for their cumulative effects on the soil resource. The following discussion focuses on those activities that may contribute negative or positive effects.

Soil Erosion

Same as Alternatives 2, 3, and 4.

Soil Productivity

Same as Alternative 1.

Consistency With Direction and Regulations

All alternatives would be consistent with Forest Plan soil protection standards. All Forest-Wide Standards would be met (see "Regulatory Framework" section).

Irreversible/ Irretrievable Effects

If a wildfire burns after about 10-15 years from the present, the risk of soil erosion and loss of soil productivity is higher under Alternatives 1, 3, 4, and 5 than Alternative 2.

Alternatives 1 (No Action Alternative) and 5 (Restoration only) pose the highest potential for detrimental burning of soil because they leave all of the wood material. No other irreversible impacts are expected.

Aquatics - Fish/ Water Quality

Introduction

This section of the FEIS analyzes effects from proposed activities on: 1) aquatic habitats, 2) aquatic management indicator species, 3) Region 6 sensitive species, 4) aquatic species and habitats protected by the ESA, and 5) water quality. This section includes hydrology analysis and incorporates conclusions from soils analysis.

Major limiting factors for the analysis area are elevated levels of fine sediment and water temperatures in the Little Malheur River watershed. Both of these limiting factors reflect effects from past and current management activities as well as the 2002 Monument Fire. Elevated levels of fine sediment can result in filling of interstitial spaces (i.e. gaps between rocks on stream bottoms) thus eliminating habitat for many macroinvertebrates and various life stages of fish species. Spawning success of salmonids can also be adversely affected by increases in fine sediment in spawning gravels.

Elevated water temperatures can limit populations of fish species adapted to cold waters and can result in extirpation of some species such as bull trout. The Little Malheur River, from its mouth to headwaters, is currently on Oregon's 303(d) list for exceeding state water temperature standards for rearing habitat for salmon and trout. No other streams within the Project Area are listed.

In the future, the amount of woody debris (including large woody debris), in stream channels and the availability of replacement LWD are concerns due to direct and indirect effects from the 2002 fire. Potential levels of LWD in the lower reaches of Camp Creek and the Little Malheur River in the project area were analyzed over the next 100 years.

Regulatory Framework

Malheur Forest Plan

The Malheur National Forest Plan (USDA 1990) as amended, provides direction to protect and manage resources. Only direction pertaining to the water resources portion of the Burned Area Recovery project is included here.

Forest Plan Goals for water resources

- Provide a favorable flow of water (quantity, quality, and timing) for off-Forest users by improving or maintaining all watersheds in a stable condition. (Goal 27, p. IV-2)
- Maintain or enhance water quality to meet State of Oregon standards, considering downstream uses and protection of other riparian and floodplain values. (Goal 28, p. IV-2)

Forest Plan Objectives state how resources will be managed under the Forest Plan. They are discussed by Riparian Area and for Soil and Water (only objectives pertaining to water are listed):

Riparian Area:

- All riparian areas will be managed to protect or enhance their value for water quality, fish habitat and wildlife.
- All new or updated management plans will include a strategy for managing riparian areas for a mix of resource uses. A measurable desired future riparian condition will be established based on existing and potential vegetative conditions. When current riparian condition is less than that desired, objectives will include a schedule for improvement. (Note: Access and Travel Management Plans are proposed under alternatives 2, 3, and 4).

Water:

- Manage soil and water resources to maintain or enhance long-term productivity of the Forest.
- Much of the management activity under this Plan will be directed toward improving those riparian areas that are in undesirable condition. A combination of watershed improvements in or adjacent to riparian areas will be the major soil and water improvement activities on the Forest. Any one method, or combination of methods, may be incorporated to treat a less than desirable riparian area.
- Integrate mitigation into management activities. Examples of mitigation for soil and water protection include waterbarring skid trails, seeding disturbed soil along riparian areas and size and distribution of harvest units.

Forest-wide Standards

Protection of Water Quality:

- Comply with State requirements in accordance with the Clean Water Act for protection of waters of the State of Oregon (Oregon Administrative Rules, Chapter 34041) through planning, application, and monitoring of best management practices (BMPs) in conformance with Clean Water Act, regulations, and federal guidance issued thereto (Standard 117).
- In cooperation with the State of Oregon, the Malheur National Forest will use the following process (Standard 118):
 - (a) Select and design BMPs based on site-specific conditions
 - (b) Implement and enforce BMPs.
 - (c) Monitor to ensure that practices are correctly applied as designed
 - (d) Monitor to determine effectiveness of practices in meeting design expectations and in attaining water quality standards.
 - (e) Evaluate monitoring results and mitigate where necessary to minimize impacts from activities where BMPs do not perform as expected.
 - (f) Adjust BMP design standards and application when beneficial uses are not being protected and water quality standards are not being achieved. Evaluate appropriateness of water quality criteria for reasonably assuring protection of beneficial uses. Consider recommending adjustment of water quality standards.
- Implement the State Water Quality Management Plan, described in the Memoranda of Understanding between the Oregon Department of Environmental Quality and US.

Department of Agriculture.²⁹ Site-specific BMPs will be identified and documented during environmental analysis, along with evaluations of ability to implement and estimated effectiveness. BMPs are described in General Water Quality Best Management Practices, Pacific Northwest Region, November 1988. (Standard 119)

- Evaluate site-specific water quality effects as part of project planning. Design control measures to ensure projects will meet Oregon water quality standards. Projects failing to meet Oregon water quality standards shall be redesigned, rescheduled, or dropped. (Standard 120)
- Conduct a watershed cumulative effects analysis in watersheds where project scoping identifies cumulative effects of activities on water quality or stream channels as an issue. This will include land within all ownerships in the watershed. Disperse activities in time and space to the extent practicable, and at least to the extent necessary to meet management requirements. On intermingled ownerships, coordinate scheduling efforts to the extent practicable. (Standard 121)
- Rehabilitate disturbed areas that could contribute sediment to perennial streams. (Standard 122)

Management Areas and Amendments to the Forest Plan

Riparian habitats are directly affected by water and exhibit either visible vegetation or physical characteristics reflecting influence from water. The Malheur National Forest originally designated these areas under the land allocation of Management Areas (MA) 3A and 3B.

Amendment #29 of the Malheur National Forest Plan (1994) established additional Forest-wide standards by modifying Forest Plan Standard 5 for MA 3A, non-anadromous riparian areas. Modification included incorporation of numeric standards for the following aquatic habitat elements: sediment/substrate, water quality, channel morphology and riparian vegetation. Numeric standards were designed to manage designated habitat elements within their natural ranges of variability.

The Malheur National Forest Plan was amended in 1995 by direction of the Regional Forester with the Interim Strategy for Managing Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana and Portions of Nevada (INFISH) and the Interim Strategy for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH). Activities in the Monument project area fall under direction of INFISH because the project area is located outside of anadromous fish habitat.

INFISH amended the Plan by establishing riparian habitat conservation areas (RHCAs), establishing numeric riparian management objectives (RMOs), and establishing standards and guidelines for managing activities in RHCAs. INFISH replaced existing direction contained in the Forest Plan except where the Plan provided more protection for inland native fish habitat. Riparian-dependent resources receive primary emphasis in RHCAs, and management activities are subject to specific standards and guidelines.

²⁹ MOU (February 2, 1979 and December 2, 1982), and Attachments A and B' referred to in this Memoranda of Understanding (Implementation Plan for Water Quality Planning on National Forest Lands in the Pacific Northwest, December 1978, and Best Management Practices for Range and Grazing Activities on Federal Lands, respectively).

RHCAs are differentiated by the following four categories of which three are present in the Monument Fire Recovery project area (Table A-1). INFISH establishes default buffers for RHCAs on the Forest (USDA 1995a: A-4 to A-6). Default values for priority watersheds were used for this project. INFISH priority watersheds were designated based on the presence of bull trout. Swamp Creek subwatershed is located in the North Fork Malheur River watershed, an INFISH priority watershed; Category 4 buffers are 100 ft by default. Bull trout are now known to be seasonally present in the lower one mile of the Little Malheur River therefore the 100 ft buffer width was used for streams in Little Malheur River watershed.

Table A-1. RHCA Buffer Widths

| RHCA Category | Description | RHCA Width (Feet) |
|----------------------|--|--------------------------|
| 1 | Fish bearing streams that are either perennial or intermittent | 300 |
| 2 | Non-fish bearing streams that are perennial | 150 |
| 4 | Non-fish bearing streams that are intermittent | 100 |
| 4 | Ponds, lakes, or wetlands < 1 acre | 50 |

INFISH Standards and Guidelines

- Prohibit timber harvest, including fuelwood cutting, in RHCAs except where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in RHCAs only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other RMOs, where adverse effects can be avoided to inland native fish. For priority watersheds, complete watershed analysis prior to salvage cutting in RHCAs. (INFISH Standard TM-1a)
- For each existing or planned road, meet the RMOs and avoid adverse effects to inland native fish by minimizing road and landing locations in RHCAs. (INFISH Standard RF-2b)
- Determine the influence of each road on RMOs. Meet RMOs and avoid adverse effects on inland native fish by:
 - reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or retard attainment of RMOs, or do not protect priority watersheds from increased sedimentation. (INFISH Standard RF-3a)
 - prioritizing reconstruction based on the current and potential damage to inland native fish and their priority watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of RHCAs. (INFISH Standard, RF-3b)
 - Closing and stabilizing or obliterating, and stabilizing roads not needed for future management activities. Prioritize these actions based on current and

potential damage to inland native fish in priority watersheds, and the ecological value of the riparian resources affected. (INFISH Standard, RF-3c)

- Trees may be felled in RHCAs when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives. (INFISH Standard, RA-2)

INFISH Priority Watersheds

Priority watersheds were designated in Oregon, Idaho, Montana, Nevada, and Washington by INFISH. Criteria considered to designate priority watersheds were:

1. Watersheds with excellent habitat or strong assemblages of inland native fish, with a priority on bull trout populations.
2. Watersheds that provided for meta-population objectives.
3. Degraded watersheds with a high restoration potential.

Subwatersheds designated as INFISH priority watersheds in or adjacent to the Monument project area are (Figure 19, Map Section):

- Upper North Fork Malheur River Watershed
 - Elk Creek subwatershed
 - Swamp Creek subwatershed
- Little Malheur River Watershed
 - None Designated

Other Regulatory or Legal Requirements that Direct Watershed Management

- Section 208 of the 1972 amendments to the Federal Water Pollution Control Act (Public Law 92-500), specifically mandates identification and control of nonpoint-source pollution resulting from silvicultural activities.
- Clean Water Act, Sections 303, 319, 404:
 - Section 303(d) directs states to list Water Quality Limited Waterbodies (303(d) listed streams) and develop Total Daily Maximum Loads to control non-point source pollutant causing loss of beneficial uses. The State of Oregon has established a schedule for completing Total Daily Maximum Loads with which the Malheur National Forest is consistent. Streams in or downstream of the project area that are currently on the 303(d) list are: 1) the Little Malheur River (exceeds 64°F temperature parameter from mouth to headwaters), and 2) the North Fork Malheur River (exceeds 50°F temperature parameter from Crane Creek to headwaters). The North Fork Malheur River is not within the project area.
 - Section 319 directs states to develop programs to control non-point source pollution, and includes federal funding of assessment, planning and implementation phases. At this time, no known Section 319 projects would be detrimentally affected by project activities.
 - Section 404 controls the dredge and fill of material in waterbodies of the U.S.; culvert replacement and other project watershed improvement activities that may fall within the jurisdiction of section 404 are covered with a nationwide general permit.

- The objective of emergency watershed protection and conservation programs³⁰ is to assist in relieving imminent hazards to life and property from floods and products of erosion created by natural disasters causing sudden impairment of a watershed.

Analysis Method

Analysis Area

The analysis area consists of the Monument Fire Recovery project area, stream reaches upstream of the project area where existing conditions have potential to impact aquatic habitat in the project area, and stream reaches downstream from the project area where potential cumulative effects could occur from proposed activities. The analysis area includes streams in the Upper Little Malheur River Subwatershed in the Little Malheur River Watershed and the Spring Creek drainage in the Swamp Creek Subwatershed in the Upper North Fork Malheur River Watershed (Figure 2, Map Section).

Forest Plan Riparian Management Objectives

Information from stream surveys, supplemental stream surveys, ODFW data reports, observations of existing conditions by District fish and hydrology personnel were used to determine existing conditions of streams in the analysis area. Amendment #29 standards were used as the basis for the Monument Fire Recovery analysis since they were site-specific and provide more protection for aquatic habitat compared to INFISH RMOs.

Changes in levels of LWD were modeled for the next 100 years. A complete discussion of this analysis is presented in the aquatics and hydrology specialist report. Estimates of soil erosion (see soils specialist report) and a sediment impact model (see aquatics and hydrology specialist report) were used to estimate impacts to aquatic habitat.

Incomplete and Unavailable Information

Stream shading data were not available for the Little Malheur River and Camp Creek. The District Fishery Biologist and Hydrology Technician made estimates of stream shading based on professional judgment during visits to the project area.

Major Changes from the DEIS to the FEIS

Based on public comments the effects to Columbia spotted frogs, Malheur mottled sculpins, and redband trout were reanalyzed. The following changes in effects determinations were made:

³⁰ Section 403 of Title IV of the Agricultural Credit Act of 1978 (16 U.S.C. 2201-2205) and Title 7, Code of Federal Regulations, Part 624 (7 CFR 624), the Emergency Watershed Protection Program.

Table A-2. Effect Determinations/ Changes Between DEIS and FEIS

| Species | Watershed | Alternative | Effects Determination | |
|-------------------------|----------------------|-------------|-----------------------|-----------|
| | | | DEIS | FEIS |
| Redband Trout | Little Malheur River | 3 | NI / BI | MIIH / BI |
| | | 4 | NI / BI | MIIH / BI |
| Malheur Mottled Sculpin | Little Malheur River | 3 | NI / BI | MIIH / BI |
| | | 4 | NI / BI | MIIH / BI |
| Columbia Spotted Frog | Little Malheur River | 2 | NI | MIIH |

Notes: MIIH = may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species; NI = no impact; BI = Beneficial Impact.

Forest Plan Riparian Management Objectives (Forest Plan Amendment 29)

Critical aquatic habitat elements defined by the Malheur NF Forest Plan (Forest Plan Amendment 29) and ODEQ water quality standards include: 1) pool frequency, 2) LWD, 3) replacement LWD, 4) bank stability, 5) width to depth ratio, 6) sediment/substrate (fine sediment), 7) shading, and 8) water temperature. These elements are important in maintaining function and health of riparian and aquatic habitats. The eight elements can be combined into the following groups: physical habitat elements (e.g. LWD, replacement LWD, pool frequency, fine sediment), channel stability elements (e.g. width to depth ratio, bank stability), and water quality elements (e.g. shading, water temperature).

Affected Environment and Environmental Effects - Physical Habitat Elements

Large Woody Debris

Affected Environment

Woody debris plays an important role in forested stream reaches. Woody debris aids in dissipating stream energy, trapping sediment, and in formation of pools and associated aquatic habitat. Woody debris also provides hiding cover for aquatic organisms.

Large pieces of woody debris generally account for the majority of pool formation and are the most stable pieces (compared to smaller pieces) of woody debris. Woody debris must be > 12" in diameter 35 ft from the large end to be classified as LWD under INFISH. Region 6 further divides LWD into two size classes on Forests east of the Cascades (Table A-3).

Malheur N.F. has an additional size standard for LWD in lodgepole pine ecosystems because of the smaller size potential for LWD in these ecosystems (Table A-3).

Table A-3. Size Classes of Large Woody Debris.

| Ecosystem | Size Class | Size Standard | Description |
|--------------------------------|------------|---------------|--|
| Ponderosa Pine & Mixed Conifer | Medium | Region 6 | Diameter > 12 in, at a length of 35 ft from the butt |
| | Large | Region 6 | Diameter > 20 in, at a length of 35 ft from the butt |
| Lodgepole Pine | Medium | Malheur N.F. | Diameter > 6 in, at a length of 20 ft from the butt |
| | Large | Malheur N.F. | Diameter > 12 in, at a length of 35 ft from the butt |

Forest Plan standard (Amendment 29) is based on expected frequencies of LWD by size classes based on ecosystem types (Table A-4).

Table A-4. Forest Plan Standards (Amendment 29) for Large Woody Debris (LWD).

| Ecosystem | Total Pieces/mile | Medium Size Class (#/mi) | Large Size Class (#/mi) |
|----------------|-------------------|--------------------------|-------------------------|
| Ponderosa Pine | 20 to 70 | 16 to 56 | 4 to 14 |
| Mixed Conifer | 80 to 120 | 64 to 96 | 16 to 24 |
| Lodgepole Pine | 100 to 350 | 90 to 315 | 10 to 35 |
| Non-forested | No standard | No standard | No standard |

Currently, five of the 10 surveyed stream reaches in the analysis area are meeting the Forest Plan standard for LWD (Table A-5).

Table A-5. Number of Pieces of LWD Per Reach.

| Stream | Number of Pieces of LWD per Mile by Reach | | | |
|------------------|---|---------|---------|---------|
| | Reach 1 | Reach 2 | Reach 3 | Reach 4 |
| Little Malheur R | 9 | 21 | 38 | 91 |
| Camp Cr | 51 | 107 | 94 | 65 |
| Hunter Cr | 18 | --- | --- | --- |
| Spring Cr | 53 | --- | --- | --- |

Note: Shading indicates that the Forest Plan Standard for LWD is met.

Direct / Indirect Effects

Alternative 1 (No Action):

In areas that burned with moderate to high intensities, the fire damaged some of the existing LWD. Damage ranged from partial to entire consumption of pieces reducing the effectiveness of LWD in stabilizing stream channels and floodplains. Partially damaged LWD is vulnerable to movement during high flow events. Where entire pieces of LWD were consumed, fine sediment deposits are vulnerable to erosion during high flow events.

Alternative 2:

Alternative 2 will have no effect on current LWD levels in the analysis area. While salvage logging activities are proposed in Category 1 RHCAs adjacent to Camp Creek and the Little Malheur River salvage of existing LWD in stream channels is not proposed. Disturbance or displacement of existing LWD is unlikely to occur during salvage activities because helicopters will be used to yard salvaged material from RHCAs.

Alternatives 3, 4, and 5:

Alternatives 3, 4, and 5 will have no effect on current LWD levels in this analysis area because salvage activities are not proposed in Category 1 RHCAs. LWD levels will increase over time as dead standing trees are recruited into stream channels (see replacement LWD discussion).

Replacement Large Woody Debris*Affected Environment*

The Forest Plan requires that enough standing trees be available in forested stands adjacent to stream channels to provide replacement of existing LWD as it is depleted through time.

We estimate that to meet the minimum Forest Plan standard for LWD (i.e. 20 pieces per mile), 391 standing dead trees per mile would be needed for replacement of LWD in ponderosa pine ecosystems (Table A-6). See the Aquatics and Hydrology specialist report for a description of methods used to estimate future LWD levels.

Table A-6. Number of Standing Dead Trees Per Mile Needed to Provide Replacement LWD In Ponderosa Pine Ecosystems to Meet Minimum Forest Plan Standards.

| Size Class | Number of Standing Dead Trees per Mile Needed to Meet Minimum Standard for Replacement LWD |
|------------|--|
| Medium | 313 |
| Large | 78 |
| Total | 391 |

We estimated the depletion of existing LWD and accumulation new LWD to determine if future woody debris needs would be met for Reaches 1 and 2 of the Little Malheur River and Camp Creek because of potential effects from salvaging dead trees < 20" dbh adjacent to these reaches. No estimates were made for the other stream reaches in the project area because management activities that would potentially impact future levels of woody debris in these reaches are not proposed.

*Direct / Indirect Effects**Alternative 1 (No Action):*

Based on the estimated depletion of existing LWD and estimated recruitment of available replacement LWD, the Little Malheur River is likely to meet Forest Plan standards for LWD for the next 100 years (Figure A-2). LWD levels will spike from 20 to 30 years after the fire when the majority of standing dead trees will have fallen. LWD in lower reaches of the Little Malheur River portion of the fire area may reach as high 89 pieces per mile around

2028 (Figure A-1). By 2103, about the time that new trees have reached the size necessary to provide new LWD (about 20" dbh), LWD levels will drop to about 30 pieces per mile in the Little Malheur River (Figure A-1).

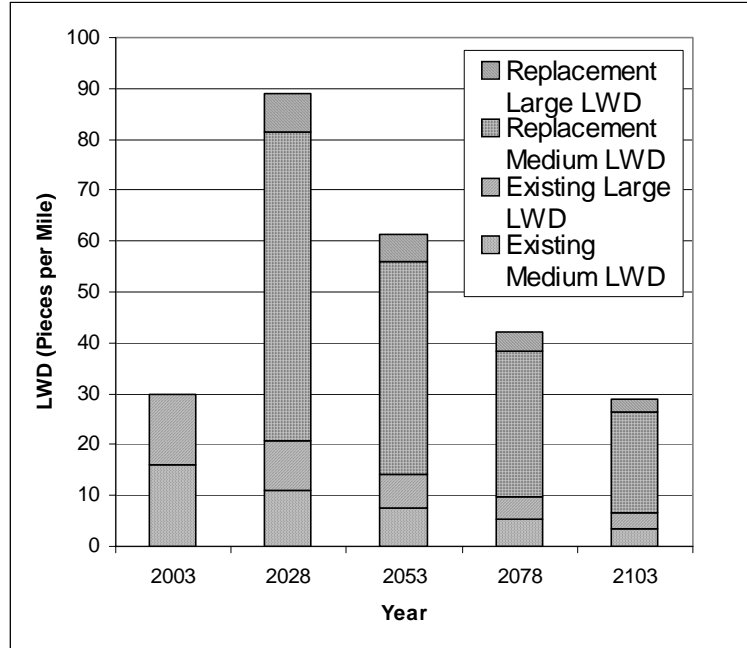


Figure A-1. Predicted changes in LWD levels as existing LWD is depleted and replacement LWD is recruited into the Little Malheur River,³¹ Monument planning area from 2003 through 2103.

Note: The Forest Plan standard is 20 to 70 pieces per mile.

Based on estimated depletion of existing LWD and estimated recruitment of available replacement LWD, Camp Creek is likely to meet the Forest Plan standard for LWD for the next 100 years (Figure A-2). Levels of LWD will spike from 20 to 30 years after the fire when the majority of standing dead trees will have fallen. LWD in the lower reaches of Camp Creek may reach as high 246 pieces per mile around 2028 (Figure A-2). By 2103, about the time that new trees have reached the size necessary to provide new LWD (about 20" dbh), LWD levels will drop to about 80 pieces per mile in Camp Creek (Figure A-2).

³¹ (Burnt portion of Reach 1 combined with Reach 2)

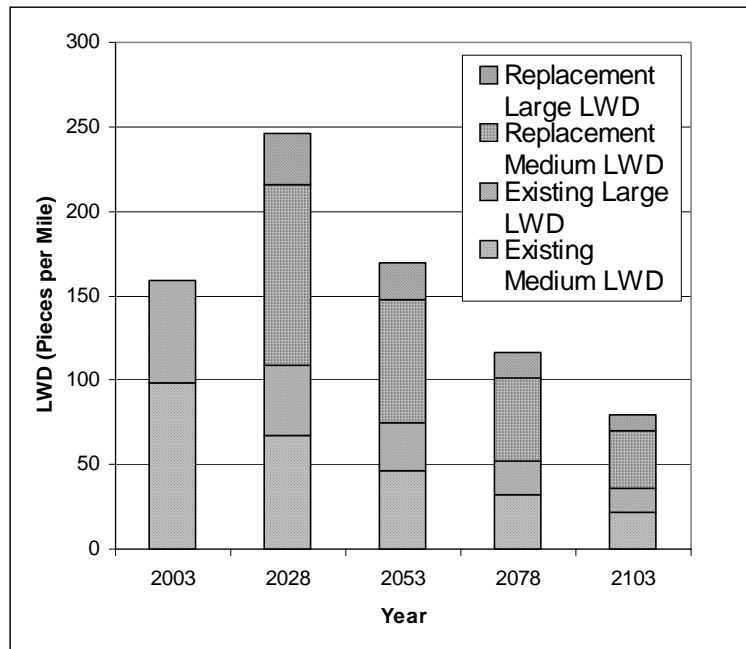


Figure A-2. Predicted changes in LWD levels as existing LWD is depleted and replacement LWD is recruited into Camp Creek (Reaches 1 and 2) Monument planning area from 2003 through 2103

Note: The Forest Plan standard is 20 to 70 pieces per mile.

Alternative 2:

Alternative 2 will have no effect on future LWD levels in the analysis area. Salvage activities are proposed in Category 1 RHCAs adjacent to Camp Creek and the Little Malheur River. However, standing dead trees sufficiently large to meet size criteria for LWD will not be salvaged. Therefore, under Alternative 2 levels of LWD over the next 100 years will be the same as levels under Alternative 1.

Alternatives 3, 4, and 5:

Alternatives 3, 4, and 5 will have no effect on future LWD levels in the analysis area because salvage activities are not proposed in Category 1 RHCAs. Therefore, under these alternatives levels of LWD over the next 100 years will be the same as levels under Alternative 1.

Pool Frequency

Affected Environment

Pool frequency is a gauge of aquatic habitat diversity, and an indicator of the degree to which streams are capable of supporting a varied and complex community of fish species. Pools are important for providing rearing habitat for juvenile fish and cool-water refugia areas for adult fish during periods of low flow and elevated temperatures.

Pool spacing varies by channel morphology (Rosgen, 1996). Spacing between pools is calculated based on the bankfull width of the stream channel. The Forest Plan standard for pools is based on expected spacing between pools from Rosgen (1994) for “B” and “C” channel types. The standard for pool spacing is a pool at least every 4 to 7 bankfull widths (BFWs).

Currently, six of the 10 surveyed stream reaches in the analysis area are meeting the Forest Plan standard for pool frequencies (Table A-7).

Table A-7. Spacing of Pools by Reach.³²

| Stream | Spacing of pools (by BFWs) by Reach | | | |
|------------------|-------------------------------------|---------|---------|---------|
| | Reach 1 | Reach 2 | Reach 3 | Reach 4 |
| Little Malheur R | 8.3 | 6.5 | 3.9 | 6.8 |
| Camp Cr | 6.6 | 5.5 | 6.4 | 8.4 |
| Hunter Cr | 28.4 | --- | --- | --- |
| Spring Cr | 17.8 | --- | --- | --- |

Direct / Indirect Effects

Alternative 1 (No Action):

The number of pools in the analysis area may decline as existing woody debris is destabilized and floated away. This decline would likely last for 5 to 10 years when large amounts of woody debris will begin to be recruited into stream channels. A majority of woody debris will likely be recruited into channels from 20 to 30 years following the 2002 fire.

Pool frequencies will likely increase as new woody debris is recruited into stream channels. Based on research on the Forest, about 11% of woody debris in channels is effective in creating pools (Cordova, 1995). Based on the estimated number of trees > 20" dbh likely to fall into the channel, 23 new pools may be formed by replacement LWD in the lower reaches of the Little Malheur River and 48 new pools in the lower reaches of Camp Creek (Table A-8).

Table A-8. Estimated Number of Pools Likely to be Formed in the Little Malheur River and Camp Creek as Replacement LWD is Recruited into Stream Channels.

| Stream | Number of Standing Dead Trees per Mile ($\geq 20''$ dbh) | Number of Trees Likely to be Recruited per Mile | Number of Pools Likely to be Formed per Mile | Total Number of Pools Likely to be Formed |
|----------------------|---|---|--|---|
| Camp Creek | 595 | 136.9 | 15.1 | 48 |
| Little Malheur River | 298 | 68.5 | 7.5 | 23 |

Woody debris smaller than LWD is generally too small to be effective in directly forming pools. Smaller pieces of woody debris normally indirectly increase pool habitat by increasing the size of woody debris accumulation to a point where a pool is scoured, or by increasing the size or depth of existing pools. Under some circumstances, woody debris smaller than LWD will directly form pools. Important factors determining the effectiveness of woody debris in creating pools is the relationship between the diameter of a piece of

³² Spacing based on the number of BFWs between pools. Shading indicates that the Forest Plan Standard for pools is being met.

woody debris and the bankfull width of the channels (Beechie & Sibley, 1997). Based on Beechie & Sibley (1997), the minimum effective size of woody debris for forming pools is estimated to be about 8.3 inches for the Little Malheur and about 5.5 inches for Camp Creek. Based on the estimated number of trees < 20" dbh likely to fall into the channel that meet the above diameter sizes, two pools may be formed by in the lower reaches of the Little Malheur River and 18 in the lower reaches of Camp Creek in (Table A-9). These pools will be created in addition to those by LWD.

Table A-9. Estimated Number of Pools That Will Be Formed From Small Woody Debris (< 20" diam) for the Little Malheur River and Camp Creek.³³

| Stream | Minimum Diameter for Effective Pool Formation | Minimum dbh for Effective Pool Formation (@35') | Total Number of Trees Available | Number Trees That Could Potentially Reach the Channel | Estimated Number Pools Created by Woody Debris |
|-------------------|---|---|---------------------------------|---|--|
| Little Malheur R. | 8.3" | 17" | 95 | 22 | 2 |
| Camp Cr. | 5.5" | 14" | 700 | 161 | 18 |

Alternative 2:

Compared to Alternative 1, Alternative 2 will result in a reduction of woody material in the Little Malheur River and Camp Creek due to salvage of standing dead trees < 20" dbh. The mean height for trees in this size class is about 60 ft. This creates an influence zone for woody debris of about 25 ft wide on either side the channel for the Little Malheur River and Camp Creek for trees in this size range. About 5 trees per acre < 20" dbh adjacent to the Little Malheur River and about 35 per acre adjacent to Camp Creek will be removed from within this zone of influence. Salvage of standing dead trees < 20" dbh in RHCAs prescribed in Alternative 2, may result in a reduction in two pools (0.7 pools/mile) in the Little Malheur River and 18 pools (5.6 pools/mile) in Camp Creek compared to Alternative 1 (Table A-9).

Alternatives 3, 4, and 5:

Alternatives 3, 4, and 5 will have no effect on the number of pools in the analysis area because activities in RHCAs that would disrupt pool formation are not proposed. Numbers of pools over the next 100 years will be the same as under Alternative 1.

Embeddedness / Fine Sediment

Affected Environment

Composition of stream substrate is an important feature of aquatic habitat. Cobble and gravel substrates provide habitat for a diverse assemblage of benthic macroinvertebrates as well as eggs and early life stages of numerous fish species. Macroinvertebrates are a substantial portion of the diet available to salmonids and sculpins.

Filling of interstitial spaces (e.g. gaps between rocks on stream bottoms) with fine sediment (particles < 6 mm in size), eliminates habitat for many macroinvertebrates. Fish eggs and early life stages can also be buried and smothered when interstitial spaces are embedded with fine sediment. Winter habitat for juvenile salmonids and hiding cover for sculpins are also lost as interstitial spaces are embedded with fine sediment.

³³ Minimum diameter based on Beechie and Sibley (1997). Number of pools formed based on Cordova (1995).

Embeddedness data is no longer collected during Region 6 stream surveys. Instead, stream substrate data is collected using pebble count procedures. Either methodology can be used to estimate the amount of fine sediment in streams. Adverse impacts to macroinvertebrates and fish can occur where fine sediment exceeds 20% of the surface area of a streambed or embeddedness exceeds 20% (Table A-10).

Table A-10. Potential Effects to Aquatic Organisms from Fine Sediment.

| Percentage of Fine Sediment <6 mm | Effects to Aquatic Organisms |
|-----------------------------------|-------------------------------|
| 0 to 15 | None |
| >15 to 20 | Potential for Adverse Effects |
| > 20 | Adverse Effects Likely |

Currently, three of the 10 surveyed stream reaches in the analysis area are meeting the Forest Plan standard for fine sediment (Table A-11).

Table A-11. Percentage of Fine Sediment³⁴ by Reach.

| Stream | Percentage of Fine Sediment by Reach | | | |
|----------------------|--------------------------------------|---------|-----------------|-----------|
| | Reach 1 | Reach 2 | Reach 3 | Reach 4 |
| Little Malheur River | 38.5 | 20.5 | <i>15 to 20</i> | <i>50</i> |
| Camp Creek | 35.3 | 41.5 | 48.5 | 55.0 |
| Hunter Creek | 7.3 | --- | --- | --- |
| Spring Creek | 20.0 | --- | --- | --- |

Note: Shading indicates that the Forest Plan standard is being met. Italics indicate estimate based on observations by the District fishery biologist and hydrology technician.

Following the 2002 fire, intense thunderstorms occurred in the project area on August 23 and 24, 2002. Large quantities of fine sediment and ash were transported to Camp Creek and the Little Malheur River from adjacent hill slopes and Category 4 tributaries. The effects of the 2002 fire combined with the late August thunderstorms on fine sediment levels in the Little Malheur River are evident. Fine sediment levels tripled for Reach 1 from 13.3% in 1999 to 38.5% in 2002 (Table A-12). Based on field observations, fine sediment levels in Reach 4 have probably tripled too because of the fire and thunderstorms. Fine sediment levels will continue to increase because of increases in soil erosion rates due to the 2002 fire.

³⁴ (Particles < 6mm)

Table A-12. Levels of Fine Sediment (particles < 6mm) in the Little Malheur River.³⁵

| Stream | Reach | Particles < 6mm (%) | | Comments |
|-------------------|-------|---------------------|-----------------|---------------------------------------|
| | | 1999 | 2002 | |
| Little Malheur R. | 1 | 13.3 | 38.5 | |
| | 2 | 21.0 | 20.5 | |
| | 3 | 17.5 | <i>15 to 20</i> | 2002 level based on field observation |
| | 4 | 17.0 | <i>50</i> | 2002 level based on field observation |

Additional fine sediment was transported into the Little Malheur River and Camp Creek during the spring melt off in late May of 2003 and during intense thunderstorms which occurred during late July of 2003.

The majority of roads located in RHCAs in the analysis area are native surface roads (Table A-14). Native surface roads are more likely to contribute fine sediment to streams that can adversely affect aquatic habitat compared to roads with other surface types. Adverse affects are more likely to occur where native surface roads are located adjacent to Category 1 streams. Over 80% of roads located in Category 1 RHCAs in the project area are native surface roads (Table A-13).

Table A-13. Miles of Roads in RHCAs by Surface Type in the Analysis Area.

| Surface Type | Miles in Cat 1 RHCAs | Miles in Cat 2 RHCAs | Miles in Cat 4 RHCAs |
|-----------------|----------------------|----------------------|----------------------|
| Crushed Rock | 0.0 | 0.0 | 0.4 |
| Improved Native | 1.5 | 0.1 | 0.1 |
| Native Material | 7.8 | 0.7 | 2.8 |
| Asphalt | 0.1 | 0.0 | 0.2 |
| Total | 9.4 | 0.8 | 3.5 |

Fine sediment levels are likely elevated in the Upper Little Malheur River subwatershed portion of the project area due to the number of native surface roads located in RHCAs (Table A-13). Fifteen roads, totaling about 9.5 miles in length, were identified as contributing to elevated levels of fine sediment in Camp Creek and the Little Malheur River (Table A-14).

³⁵³⁵Sites are arranged from downstream to upstream. Data for 1999 from stream survey. Data for 2002 from supplemental stream survey. Levels of fine sediment in italics are estimated.

Table A-14. Roads Identified as Contributing to Elevated Levels of Fine Sediment in the Project Area.

| Subwatershed | Road No. | Current Status | Proposed Status | Road Miles | Surface Type |
|--------------|----------|----------------|--------------------|-------------|--------------|
| U.L.M.R. | 1600202 | Closed | Decommission | 0.90 | Native |
| U.L.M.R. | 1600303 | Closed | Decommission | 0.35 | Native |
| U.L.M.R. | 1672264 | Open | Decommission | 0.32 | Native |
| U.L.M.R. | 1672478 | Open | Decommission | 0.19 | Native |
| U.L.M.R. | 1672479 | Open | Decommission | 3.64 | Native |
| U.L.M.R. | 1672482 | Open | Decommission | 0.38 | Native |
| U.L.M.R. | 1672483 | Open | Decommission | 0.27 | Native |
| U.L.M.R. | 1672484 | Open | Decommission | 0.26 | Native |
| U.L.M.R. | 1672485 | Open | Decommission | 0.27 | Native |
| U.L.M.R. | 1672486 | Open | Decommission | 0.66 | Native |
| U.L.M.R. | 1672491 | Open | Decommission | 0.26 | Native |
| U.L.M.R. | 1672492 | Open | Decommission | 0.50 | Native |
| U.L.M.R. | 1672493 | Open | Decommission | 0.77 | Native |
| U.L.M.R. | 1672494 | Closed | Decommission | 0.35 | Native |
| U.L.M.R. | 1672495 | Closed | Decommission | 0.42 | Native |
| | | | Total Miles | 9.54 | |

There are about 2.2 miles of old skid trails in the project area that date from timber harvest activities during the late 1960s. These skid trails have been chronic sources of fine sediment due to their location adjacent to or in Category 4 stream channels and have likely contributed to elevated levels of fine sediment in the lower reaches of Camp Creek and the Little Malheur River. The majority of these skid trails are located in the Camp Creek drainage.

Direct / Indirect Effects

Alternative 1 (No Action):

The 2002 fire resulted in large increases in fine sediment in Camp Creek and the Little Malheur River in 2003. The Disturbed Water Erosion Prediction Project (WEPP, Elliott et al., 2000) model predicted that about 107,078 tons of fine sediment from severely burned areas in the upper Little Malheur River subwatershed had the potential to be transported into the Little Malheur River and Camp Creek in 2003. Based on a simple sediment impact model (see Aquatics and Hydrology specialist reports) this amount of sediment has the potential to result in adverse impacts to aquatic habitat due to filling of interstitial spaces in the Little Malheur River and Camp Creek in and downstream of the project area. Adverse impacts could potentially affect about 27.8 miles of the Little Malheur River downstream from Camp Creek.

These predicted increases in fine sediment will likely result in decreases in pool depths, filling of interstitial spaces in cobble substrate, and degradation of spawning gravels. This will likely result in loss of habitat for benthic macroinvertebrates, winter habitat for juvenile

salmonids, and spawning and rearing habitat for sculpins. Increases in fine sediment in spawning gravels will reduce spawning success of salmonids.

WEPP and the sediment impact model predict that the amount of erosion from the fire area will rapidly decline in 2004 and return to pre-fire levels in 2005 due to the recovery of ground cover in severely burned areas. Johnson (1998) found that in the Blue Mountains of Oregon, ground cover in severely burned forests and grasslands normally recovers to pre-fire levels in about five years. Assuming similar recovery rates hold for the Monument Fire area, recovery of ground cover will likely return to pre-fire levels and erosion rates will likely return to background levels sometime from around 2005 to 2007. It will likely take at least two additional years for fine sediment levels to return to pre-fire levels in low gradient reaches of the Little Malheur River and Camp Creek as fine sediment is flushed through the system during spring runoff events.

Elevated levels of fine sediment in the Little Malheur River and Camp Creek from road and old skid trail sources would continue under Alternative 1 once the increased levels of fine sediment from the 2002 fire has abated.

Adverse impacts to aquatic habitat in Spring Creek, in the Upper North Fork Malheur River Watershed, are not likely to occur because of Alternative 1. Impacts from the fire were relatively light with few impacts to RHCAs or stream channels. The 2002 fire did not occur along Category 1 or Category 2 streams in the Upper North Fork Malheur River Watershed. About 22 acres in Category 4 RHCAs burned during the fire of which 10 acres burned moderately and 12 acres burned lightly. Fine sediment transported off of burned areas will likely be trapped in Category 4 RHCAs before reaching Spring Creek, the nearest Category 1 stream. Fine sediment is currently at the 20% threshold level in Spring Creek. However, the majority of this fine sediment appears to be road related and additional fine sediment from the fire area is not likely to reach fish bearing portions of Spring Creek.

Alternative 2:

Under Alternative 2 proposed salvage-logging activities in the Upper Little Malheur River subwatershed would be conducted using helicopter-logging techniques. Trees will be manually felled with chainsaws and yarded to landings by helicopter. Klock (1975) found little soil disturbance in burned areas where helicopters were used for yarding. In his helicopter study area, 88% of the area had no soil disturbance, 11.3% was slightly disturbed, and 0.7% was severely disturbed (Klock, 1975). Erosion occurred on 29.2% of the burned area logged with helicopters of which 3.4% was related to logging activities (Klock 1975). Based upon these findings, soil disturbance resulting from salvage activities using helicopter-logging techniques will not likely result in an increase in erosion rates.

Salvage-logging activities in the Upper Little Malheur River subwatershed will result in an increase in ground cover from creation of slash. Ground cover reduces the potential for soil erosion to occur. The increase in ground cover is predicted to reduce erosion by 10% from salvage units. Based on our sediment impact model, this would result in about a 14% reduction in adverse impacts to aquatic habitat in the Little Malheur River downstream of Camp Creek in 2004 under Alternative 2 compared to Alternative 1. Erosion rates from the fire area are likely to be similar under Alternative 2 and Alternative 1 after 2004 due to the recovery of herbaceous ground cover.

Fifteen roads, totaling about 9.5 miles in length, that are contributing to elevated levels of fine sediment in the Little Malheur River and Camp Creek will be decommissioned under

Alternative 2 (Table A-15). Elimination of these sources of fine sediment would reduce fine sediment levels in Camp Creek and the Little Malheur River below the baseline condition.

These old skid trails are proposed to be obliterated. About 5 acres of ground disturbance will occur during obliteration of old skid trails. There is a potential for an increase in fine sediment in Camp Creek for up to two to three years from this activity because soil disturbance will occur adjacent to Category 4 stream channels in unstable soils. These potential adverse effects will likely be limited to the lower portions of Camp Creek. Mitigation measures (placement of woody debris, seeding, and straw mulching) will be used to reduce the potential for erosion.

Obliteration of old skid trails will result in a long-term reduction of fine sediment in the Camp Creek drainage because natural drainage patterns will be restored. Alternative 2 will result in improved aquatic habitat conditions compared to Alternative 1. Improvement will be evident in about seven years when streams recover from increased erosion rates from the 2002 fire.

Overall, Alternative 2 will decrease fine sediment levels in the long-term in Camp Creek and the Little Malheur River below pre-fire levels compared to Alternative 1 due to reduction in fine sediment from native surface roads and old skid trails.

Alternative 2 proposes to conduct salvage activities on about 490 acres in the Swamp Creek subwatershed. Units to be salvaged in the Swamp Creek subwatershed (the majority of which drain into Spring Creek) are relatively flat (slopes <30%) and contain ash soils having low potential for erosion. These units will be tractor logged. Salvage activities are not planned for RHCAs in the Swamp Creek subwatershed under Alternative 2. Adverse effects to aquatic habitat and species are not expected to occur due to the low erosion potential on these units and the current condition of RHCAs.

Alternatives 3 and 4:

Felling and yarding activities in the uplands will be the same as proposed under Alternative 2. Impacts to aquatic habitat from salvage activities outside of RHCAs are unlikely based on Klock's findings (Klock, 1975).

Based on a 10% reduction in erosion in salvage units and our sediment impact model, this would result in about a 10% reduction in adverse impacts to aquatic habitat in the Little Malheur River downstream of Camp Creek in 2004 under Alternatives 3 and 4 compared to Alternative 1. Erosion rates from the fire area are likely to be similar under Alternatives 3 and 4 as Alternative 1 after 2004 due to the recovery of herbaceous ground cover.

Road closure and decommissioning activities in the Upper Little Malheur River subwatershed are the same as those proposed under Alternative 2. Effects to aquatic habitat and species will be the same as those described under Alternative 2.

Old skid trails dating from the late 1960s will be obliterated and restored to natural conditions. Effects to aquatic habitat and species will be the same as those described under Alternative 2.

Overall, Alternatives 3 and 4 will decrease fine sediment levels in the long-term in Camp Creek and the Little Malheur River below pre-fire levels compared to Alternative 1 due to the reduction in fine sediment from native surface roads and old skid trails.

Alternatives 3 and 4 propose to conduct salvage activities on about 305 and 459 acres respectively in the Swamp Creek subwatershed. No salvage activities are planned for RHCAs in the Swamp Creek subwatershed under Alternatives 3 and 4. Effects to aquatic habitat and species will be the same as those described under Alternative 2.

Alternative 5:

In the short-term, fine sediment levels in the Upper Little Malheur River subwatershed would be similar to those under Alternative 1 because increases in ground cover related to salvage activities would not occur. Road closure and decommissioning activities on roads that are current sources of fine sediment are the same as those proposed under Alternative 2. Effects to aquatic habitat and species will be the same as those described under Alternative 2. Old skid trails dating from the late 1960s will also be obliterated and restored to natural conditions as proposed under Alternative 2. Effects to aquatic habitat and species will be the same as those described under Alternative 2. Overall, Alternative 5 will decrease fine sediment levels in the long-term in Camp Creek and the Little Malheur River below pre-fire levels compared to Alternative 1 due to the reduction in fine sediment from native surface roads and old skid trails.

Affected Environment and Environmental Effects - Channel Stability Elements

Bank Stability

Affected Environment

The Forest Plan standard for stream bank stability calls for 90% of banks to be stable. No decrease in bank stability is allowed because of management activities if bank stability is greater than 90%. Bank stability plays an important role in determining the stability of some types of stream channels present in the Monument project area (Table A-15). “C” channel types (especially C4 channel types) present in the project area are very sensitive to disturbance due to the importance of bank vegetation in maintaining stable channels.

Table A-15. Sensitivity of Channel Type to Disturbance.³⁶

| Channel Type | Sensitivity to Disturbance | Bank Erosion Potential | Vegetation Influence on Bank Stability |
|--------------|----------------------------|------------------------|--|
| A | Very High | Very High | Negligible |
| B4 | Moderate | Low | Moderate |
| C4 | Very High | Very High | Very High |

Riparian vegetation needs to consist of deeply rooted species typical of late seral riparian plant communities in order for C4 channel types to remain stable after large disturbance events such as the 2002 Monument Fire. C4 channel types are “C” channel types that possess gravel as the dominant streambed substrate. “B” channel types are inherently more

³⁶ Table is inclusive of bank erosion potential and influence of vegetation for channel types present in the Monument project area (adapted from Rosgen, 1996).

stable compared to “C” channel types and riparian vegetation plays less of a role in maintaining stable channels (Table A-15).

Currently, two of the 10 surveyed stream reaches in the analysis area are meeting the Forest Plan standard for bank stability (Table A-16).

Table A-16. Bank Stability for Streams in the Project Area.³⁷

| Stream | Reach | Channel Type | Percent Stable Banks |
|----------------------|-------|--------------|----------------------|
| Little Malheur River | 1 | C | 65 |
| | 2 | C | 75 |
| | 3 | C/B | 81 |
| | 4 | B/A | 80 |
| Camp Creek | 1 | C | <90 |
| | 2 | C/B | <90 |
| | 3 | B | ≈90 |
| | 4 | A | ≈90 |
| Hunter Creek | 1 | C/B | <90 |

Note: Shading indicates that the Forest Plan standard is being met.

Direct / Indirect Effects

Alternative 1 (No Action):

Alternative 1, would allow channel stability elements to recover from effects of the 2002 fire at natural rates.

Almost all organic ground cover was consumed and ground cover reduced to about 10% in areas that burned with high and moderate severities (Monument BAER Report). Highly hydrophobic soil was found in about 10 to 15% of the high intensity burned areas and in about 5% of the moderate intensity burn areas. The depth of the hydrophobic layer varied, but most often started about 0.5 inch below the surface, and was 1 to 2 inches thick. At one location, the hydrophobic layer started about 4 inches below the surface and was about 5 inches thick.

Both runoff and sedimentation are expected to increase in the Little Malheur River and Camp Creek due to creation of hydrophobic soil conditions (Monument, BAER Report). Peak flows are predicted to increase by 20% in Camp Creek and by 15% in the Little Malheur River (Table A-17). These increases in peak flows will decrease as hydrophobic soil conditions return to pre-fire conditions. This will likely occur over the next three to five years.

³⁷ The Forest Plan standard for bank stability is 90% stable banks. Data for the Little Malheur River from 1999 stream survey. Bank stability estimated for Camp Creek and Hunter Creek based on 2002 field observations.

Table A-17. Pre and Post-Fire Estimated 25-Year Peak Flows for Subwatersheds Most Influenced by the Monument Fire. Flows are Expressed in Cubic Feet Per Second.

| Stream | Estimated Pre-fire Peak Flow (25 yr event) | Estimated Increase in Runoff (%) | Estimated Post-fire Peak Flow (25 yr event) |
|----------------------------|--|----------------------------------|---|
| Camp Creek | 237 cfs | 20 | 296 cfs |
| Upper Little Malheur River | 716 cfs | 15 | 842 cfs |

Channel stability would likely decrease in the Little Malheur River and Camp Creek over the next three years due to increases in peak flows and fine sediment resulting from the 2002 fire. In urban watersheds, stream channels become unstable due to increases in discharge when infiltration in the watershed is reduced by 10 percent or greater (Booth & Jackson, 1997).

Streams tend to adjust to increases in discharge by widening or down cutting. Stream bank vegetation can buffer stream channels from these. Where late seral species are present, little adjustment of the channel may occur due to high root-holding capacity. However, where bank vegetation is dominated by early seral species, channel adjustments may be dramatic due to lack of root-holding capacity.

Bank stability along the lower reaches of Camp Creek is well below 90%. Recovery of herbaceous vegetation along the lower Camp Creek will probably exceed 3 years due to the pre-fire condition of bank vegetation and the severity of the 2002 Monument Fire. Channel adjustments to increases in flow and fine sediment are likely. Such adjustments could potentially result in formation of braided channels in low gradient areas and gullying in higher gradient areas. Areas of braided channels and gullying would provide little if any habitat for fish. Formation of braided channels or gullying are less likely along the lower reaches of the Little Malheur River compared to Camp Creek due to the lower severity burn and better pre-fire condition of bank vegetation.

Alternative 2:

Direct effects to bank stability can occur during salvage logging activities in RHCAs where trees are felled or yarded over weak and unstable stream banks. To reduce the likelihood of adverse effects to stream banks, trees will be directional felled away from stream channels and yarded to landings using helicopters.

Woody debris in stream channels traps fine sediment. In stream channels the size of Camp Creek and the Little Malheur River woody debris accumulations are normally on or adjacent to stream banks. Fine sediment trapped by woody debris accumulations would normally be incorporated into stream banks increasing bank stability and narrowing channels.

Salvage of standing dead trees < 20" dbh will reduce the amount of woody debris in the stream channels of Camp Creek and the Little Malheur River. Dead trees in this size range would normally fall down 5 to 10 years following the 2002 fire. This period will likely overlap with movement of the last two years of fire related fine sediment through the system. In the short-term, some reduction in the amount of fine sediment incorporated into stream banks would occur compared to Alternative 1.

Alternative 2 would result in a long-term reduction in the amount of woody debris available to trap fine sediment from a future large erosion event such as a wildfire or flood event

compared to Alternative 1. For example, following the eruption of Mount St. Helens, the presence of large quantities of woody debris lessened the adverse effects of large increases in fine sediment on aquatic habitat compared to streams where woody debris was salvaged after the eruption (Lisle 1995). Streams where salvage occurred took longer to recover from effects of fine sediment compared to streams where salvage did not occur.

Alternatives 3, 4, and 5:

Channel stability elements will not be affected under these alternatives since standing dead trees < 20" dbh will not be salvaged from RHCA's. Recovery rates for channel stability will be the same as under Alternative 1.

Width to Depth Ratio

Affected Environment

The Forest Plan standard for width to depth ratio is based on wetted width and depth. Bankfull width to depth (W/D) ratio is one of the most sensitive indicators of channel stability (Rosgen, 1996). W/D ratios are correlated to drainage area. Natural events and management activities can result in increases in W/D ratios due to increases in sediment inputs to stream channels. As W/D ratios increase bank erosion rates increase leading to further increases in sediment supply thus perpetuating further increases in W/D ratios.

An important distinction between natural events and management activities is that increases in sediment supply resulting from natural events tend to be episodic. Stream channels can adjust to and recover from episodic increases in sediment inputs because the level of inputs eventually returns to pre-event levels.

In contrast, increases in sediment supply due to management activities tend to be more chronic in nature especially from activities such as road construction and grazing. Stream channels are less likely to recover to their former condition from chronic inputs of sediment due to the cyclic nature of the relationship between the increases in sediment supply, increases in W/D ratios, and increases in bank erosion. Rapid destabilization of channels occurs once they reach the threshold level for W/D resulting in significant adverse impacts to aquatic habitat and organisms.

Malheur River: Bankfull W/D ratios for the four reaches (range 19.4 to 22.2) are within the normal range for their respective channel types. W/D ratios will probably increase in response to increases in sediment because of the 2002 fire leading to an increase in stream bank erosion rates.

Camp Creek: W/D ratio data are not available. Based on field observations, Reaches 1 and 2 appear to be in the upper portion of the normal range for W/D for C4 channel types. Reaches 3 and 4 appear to be in the middle portion of the normal range for their respective channel types.

Hunter Creek: W/D ratio data are not available. Based on field observations, the lower portion of Hunter Creek appears to be in the upper portion of the normal range for W/D for a "B" channel type. The upper portion of Hunter Creek appears to be in the upper portion of the normal range for a "C" channel type.

Spring Creek: The W/D ratio for Spring Creek is 22.3. This is within the normal range (13.5 to 28.7) for its channel type ("C" type channel).

Direct / Indirect Effects

Alternative 1 (No Action):

W/D ratios are likely to increase because of the 2002 fire. W/D ratios will likely increase due to 1) a reduction in bank stability where bank vegetation was killed during the fire, 2) an increase in erosion rates due to the loss of ground cover in areas that were severely burnt, and 3) increases in stream discharge due to decreases in infiltration in severely burned areas. As bank vegetation, erosion rates, and infiltration rates return to pre-fire levels, W/D ratios will return to pre-fire levels.

Alternative 2:

W/D ratios in streams in the analysis area are not expected to increase because of activities proposed under Alternative 2. Proposed salvage logging activities in RHCA adjacent to Camp Creek and the Little Malheur River will not result in direct effects to stream banks because trees will be felled away from stream channels and helicopters will be used to yard logs to landings. Levels of fine sediment will decrease below pre-fire levels in the lower reaches of Camp Creek and the Little Malheur River in the long-term due to decommissioning roads and obliteration of old skid trails in the Camp Creek drainage area. Reducing the amount of fine sediment will reduce shear stress along stream banks and likely result in reducing W/D ratios below pre-fire levels.

Alternatives 3, 4, and 5

Levels of fine sediment will decrease below pre-fire levels in the lower reaches of Camp Creek and the Little Malheur River in the long-term due to decommissioning roads and obliteration of old skid trails in the Camp Creek drainage area. Reducing the amount of fine sediment will reduce shear stress along stream banks and likely result in reducing W/D ratios below pre-fire levels.

Affected Environment and Environmental Effects - Water Quality Elements

Shading and Water Temperature

Affected Environment - Shading

Little Malheur River: On the Little Malheur River, Reaches 1, 2, 3, and 4 burned severely (Figure 25, Map Section). However, shading along Reaches 1 and 2 should recover relatively quickly because shrubs were top killed for the most part and should re-sprout and return to former condition in four to five years. In contrast, Reaches 3 and 4 burned much like the lower reaches of Camp Creek and will take much longer to recover. Current shading along lower reaches of the Little Malheur River is about 40% of pre-fire conditions. Current shading along upper reaches is about 3% and consists primarily of boles of standing dead trees.

Camp Creek: The 2002 fire greatly reduced shading along the majority of stream reaches in the fire perimeter. On Camp Creek, the RHCA adjacent to Reach 1 and about two thirds of the RHCA adjacent to Reach 2 burned severely during the fire (Figure 25, Map Section). Based on visual observations, it is estimated that current shading along the lower reaches of Camp Creek are about 3% of pre-fire conditions and consists primarily of boles of standing dead trees.

Affected Environment – Water Temperature

Water temperature influences the metabolism, behavior, and mortality of fish and other aquatic organisms. Although fish may survive at temperatures near extremes of their suitable temperature range, growth rates are greatly reduced. At low temperatures, growth is reduced because all metabolic processes are slowed. At the opposite extreme, growth is reduced at high temperatures because most if not all energy from food must be used for maintenance needs. Other sub-lethal effects of high water temperatures on salmonids (trout, whitefish, char, and salmon) are: increased incidence of disease, inability to spawn, reduced survival of eggs, reduced growth and survival rates for juveniles, and reduced ability to compete with other fish species that are adapted to warmer temperatures.

Current Oregon Department of Environmental Quality (ODEQ) standards for water temperature are: seven day moving average of the daily maximum shall not exceed: 64° F (17.8° C) or 50° F (10° C) in waters that support bull trout.

Little Malheur River: The Little Malheur River, from the mouth to headwaters, is currently on the Oregon DEQ 303(d) list for exceeding the 64° F standard (Table A-18).

Table A-18. 303(d) Listed Streams in the Project Area.

| Stream | Reach | Parameter | Season |
|----------------------|---------------------|---------------------|--------|
| Little Malheur River | Mouth to headwaters | Temperature (>64°F) | Summer |

Before the 2002 fire, data shows the Little Malheur River exceeded the current ODEQ standard for salmon/trout by an average of about 10° F at the Forest Boundary and by about 9° F at the Wilderness boundary (Table A-19). In 2003, the 7 day mean maximum temperature was 79°F at the Forest boundary, about 5°F higher than the average before the 2002 fire.

Table A-19. Comparison of Pre- and Post Fire 7-Day-Mean-Maximum Water Temperatures in Streams in the Project Area.

| Stream | Location | Mean 7 Day Mean Max Temp Prior to 2002 Fire | 7 Day Mean Max Temp in 2003 |
|------------------|---|---|-----------------------------|
| Little Malheur R | 100 yds above Forest Boundary | 73.8°F ¹ | 79.0°F |
| | 400 yds above Wilderness Boundary | 72.5°F ² | No Data |
| Camp Creek | Near confluence w/ Little Malheur River | No Data | 80.4°F |
| | Near FSR 479 | No Data | 65.0°F |
| Spring Creek | Near confluence with N.F. Malheur River | 60.7°F ² | |

Note: ODEQ standard is currently 64°F for all streams.

Data periods: 1) 1993- 2001, 2) 2000 – 2001

The Little Malheur River was described as being “clear and cold” upstream of Hunter Creek in the late 1960’s (USFS 1967). Rock Creek and South Bullrun Creek are potentially important contributors of cold water to the Little Malheur River above Hunter Creek.

Camp Creek: Water temperatures were not monitored in Camp Creek before the 2002 fire. In 2003, water temperature at the lower monitoring site exceeded the ODEQ standard (Table A-18). Water temperature at the middle-monitoring site was slightly above the ODEQ standard. A comparison of water temperatures at this site and the pre-fire water temperature at the monitoring site on the Little Malheur River in the wilderness indicates the potential of Camp Creek as an important contributor of cold water to the Little Malheur River.

Hunter Creek: Water temperatures have not been monitored in Hunter Creek. Hunter Creek, in its present condition, has little potential to contribute cold water to the Little Malheur River. Hunter Creek is perennial for about 0.7 miles downstream from Hunter Spring and is then intermittent to the confluence with the Little Malheur River; about 1.2 miles. The 1934 Forest map shows Hunter Creek was perennial from Hunter Spring to the Little Malheur River.

Spring Creek: ODFW monitored water temperature in Spring Creek in 2000 and 2001. Spring Creek is currently meeting ODEQ water standard for summer water temperatures (Table A-19). Spring Creek also meets EPA’s latest recommendation for juvenile salmon/trout rearing in core habitat ($\leq 61^{\circ}\text{F}$).

Direct / Indirect Effects

Alternative 1 (No Action):

Alternative 1 would allow water quality elements to recover from effects of the 2002 fire at natural rates.

Currently, the Little Malheur River and Camp Creek are exceeding ODEQ standards for water temperature. Stream temperatures are expected to rise before of the Monument Fire. In 2003, water temperature in the Little Malheur River was about 5°F warmer at the Forest boundary compared to the pre-fire period (Table A-20). The loss of shading along Category 1 and Category 2 streams will affect stream temperatures because flow is present in these stream types during the hottest months of the year. About 70% of the area of Category 1 RHCAs and about 55% of the area of Category 2 RHCAs burned severely during the fire (Table A-20).

Table A-20. Acres Burned by RHCA Category in the Monument Fire Area.

| Fire Severity | Acres Burned by RHCA Category | | |
|---------------|-------------------------------|------------|------------|
| | Category 1 | Category 2 | Category 4 |
| Light | 27 | 25 | 78 |
| Moderate | 328 | 136 | 179 |
| Partial | 2 | 0 | 13 |
| Severe | 839 | 199 | 358 |
| Total | 1196 | 360 | 628 |

The largest increases in water temperature in the analysis area will likely occur in Camp Creek. The majority of shade along the lower reaches of Camp Creek was lost during the fire. Current shading is estimated to be about 3% of pre-fire levels. Boles of standing dead trees adjacent to lower Camp Creek are currently the only source of shade.

In comparison to Camp Creek, shade along the lower reaches of the Little Malheur River was affected less by the 2002 fire. Current shading along the Little Malheur River in the project area is estimated to be about 40% of pre-fire levels. While trees in the over story were killed during the fire, many shrubs adjacent to the channel appeared to be only top-killed. Alders showed rapid sprouting following the fire and should recover to pre-fire conditions in 5 to 10 years, depending on the amount of browsing that occurs.

Water temperatures in the analysis area will remain elevated above pre-fire levels and will gradually decline to pre-fire levels as shrubs become reestablished and shading is restored. Significant shading by shrubs such as alders will likely occur in 5 to 10 years and by cottonwood in 10 to 15 years. Black cottonwood (*Populus trichocarpa*) can grow 30 to 50 ft tall in 7 to 10 years (Crowe & Clausnitzer, 1997). Mountain alder (*Alnus incana*) can grow to 9 feet tall in 5 years. Significant shading by conifers will likely begin in 80 years.

Additional reductions in water temperature will occur as W/D ratios decrease. Stream channels will narrow as fine sediment is trapped behind woody debris and incorporated into stream banks. Narrowing of channels will reduce surface area and amount of energy absorbed, reducing the rate of stream heating.

Alternative 2:

Salvage of standing dead trees < 20" dbh will likely reduce shading along lower Camp Creek by 1% compared to Alternative 1. There is a very low likelihood of a measurable increase in water temperatures above post-fire levels by reducing shade from 3% of pre-fire conditions to 2% of pre-fire conditions.

Removal of standing dead trees < 20" dbh will likely reduce shading along lower reaches of the Little Malheur River by 1% compared to Alternative 1. There is a very low likelihood of a measurable increase in water temperatures above post-fire levels by reducing shade from 40% of pre-fire conditions to 39% of pre-fire conditions.

Alternatives 3, 4, and 5

There are no activities proposed under these alternatives that will affect shading or water temperatures. Recovery of shade and water temperatures will be equivalent to Alternative 1.

Water Quantity

Affected Environment

Water Yield: Water yield from forested areas tends to increase as the amount of non-forested area increases. Non-forested areas can result from both natural events such as fires or windstorms, or from management activities such as timber harvest or road construction. Typically, increases in water yields will decline to background levels after about 30 years. At this point, water use by young stands tends to equal pre-disturbance levels. Generally, about 20 to 30% of a subwatershed needs to be in stands less than 30 years old before there is measurable increase in water yield (Troendle & Leaf, 1980).

The Monument Fire burned in two subwatersheds where regeneration harvest activities have taken place over the last 30 years. Several other large fires have also occurred in these subwatersheds during this period. Harvest activities and burns rarely overlap due to the remoteness of fires in these subwatersheds. The 2002 Monument fire burned in several of the regeneration cuts and acreages have been adjusted accordingly.

To determine the area of hydrologic openings in formerly forested stands due to harvest activities, harvest prescriptions were used to determine hydrologic openings. In general, units that were partially cut or commercially or pre-commercially thinned were not considered hydrologic openings. In burned areas, where tree mortality was rated as moderate to high, areas were considered hydrologic openings. Tree mortality rating was based on fire severity rating and field verifications.

Before the 2002 fire, hydrologic openings accounted for about 25% of the area of the Swamp Creek subwatershed, Upper North Fork Malheur River watershed (Table A-21). The area in hydrologic openings increased to about 28% of the subwatershed following the 2002 fire (Table A-21). Based on the ages of clearcuts in the subwatershed, the percentage of the subwatershed in hydrologic openings likely will drop below the 20 to 30% threshold by about 2020.

Table A-21. Changes in Acres of Hydrologic Openings Following the 2002 Monument Fire.³⁸

| Subwatershed Name | Total Acres in Subwatershed | Acreage of Hydrologic Openings Prior to the 2002 Monument Fire (Percentage of SWS) | Acreage of Hydrologic Openings After the 2002 Monument Fire (Percentage of SWS) |
|----------------------------|-----------------------------|--|---|
| Swamp Creek | 25,600 | 6,418 (25) | 7,230 (28) |
| Upper Little Malheur River | 31,474 | 3,615 (11) | 19,269 (61) |

Before the 2002 fire, hydrologic openings accounted for about 11% of the area of the Upper Little Malheur subwatershed, Little Malheur River watershed (Table A-21). The area in hydrologic openings increased to about 61% of the subwatershed following the 2002 fire (Table A-22). With no further increase in non-forested areas, the subwatershed will likely drop below the 20 to 30% threshold by about 2033.

Peak Flows: Runoff is expected to increase in the Little Malheur River and Camp Creek due to creation of hydrophobic soil conditions during the 2002 fire (Monument BAER Report). Peak flows are predicted to increase by 20% in Camp Creek and by 15% in the Little Malheur River (Table A-22). These increases in peak flows are likely to decline to near pre-fire levels in the next year or so as hydrophobic soil conditions decline. However, peak flows are not likely to return to pre-fire levels until the percentage of the subwatershed in hydrologic openings drops below the 20 to 30% threshold until about 2033.

³⁸ The Upper Little Malheur River subwatershed includes only the Forest Service portion.

Table A-22. Pre and Post-Fire Estimated 25-Year Peak Flows for Subwatersheds Most Influenced by the Monument Fire.

| Stream | Estimated Pre-fire Peak Flow (25 yr event) | Estimated Increase in Runoff (%) | Estimated Post-fire Peak Flow (25 yr event) |
|----------------------------|--|----------------------------------|---|
| Camp Creek | 237 cfs | 20 | 296 cfs |
| Upper Little Malheur River | 716 cfs | 15 | 842 cfs |

Note: Flows are expressed in cubic feet per second.

Base Flows: Additional modifications to the hydrograph of the Little Malheur River below the Forest boundary have resulted from irrigation withdrawals and degradation of Squaw Creek. Gullying has occurred along Squaw Creek and its tributaries in response to past improper grazing management practices on the Forest and private lands, and in response to land management practices on private lands following the 1994 Ironside Fire. Low flows in the Little Malheur River downstream of Squaw Creek are likely to be below natural levels because of these factors.

Direct / Indirect Effects

Alternatives 1(No Action) and 5:

Alternative 1 would allow water quantity elements to recover from the effects of the 2002 fire at natural rates. Effects to channel stability elements due to increases in peak flows are likely to occur (see Affected Environment and Environmental Effects - Channel Stability Elements).

Alternatives 2, 3, and 4:

Salvage activities proposed under these alternatives will not result in an increase in the amount of non-forested area in the project area because the material to be removed is already dead. Green tree thinning is also unlikely to result in an increase in the amount of non-forested area because stands will be thinned to a fully stocked condition.

Changes in infiltration rates in the burned area in the upper Little Malheur subwatershed are also unlikely under these alternatives because this area will be logged with helicopters. Klock (1975) found little soil disturbance in burned areas where helicopters were used for yarding. In his helicopter study area, 88% of the area had no soil disturbance, 11.3% was slightly disturbed, and 0.7% was severely disturbed (Klock 1975).

Cumulative Effects to Physical Elements, Channel Stability Elements, and Water Quality Elements

Large Woody Debris and Replacement Large Woody Debris

Alternative 1:

Alternative 1 will not result in direct or indirect adverse effects to LWD or replacement LWD. Therefore, there will not be cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Alternatives 2, 3, 4, and 5:

Alternatives 2, 3, 4, and 5 would not result in cumulative effects to LWD or replacement LWD with activities listed in Appendix C except where discussed below:

- **Alternative 2:** In 1977, timber was harvested along the Little Malheur River as part of the Bug Butte Sale. The sale area was primarily located along the Little Malheur River from the FSR 16 to the confluence with Hunter Creek. This sale likely resulted in reduced levels of LWD in Reaches 1 and 2 of the Little Malheur River due to the salvage of trees from along the river. Salvage of standing dead trees <20" dbh as proposed under Alternative 2 will not result in a cumulative reduction in LWD below Forest Plan standards along the lower reaches of the Little Malheur River because standing dead trees large enough to serve as replacement LWD will not be salvaged.

Pool Frequency

Alternative 1:

Alternative 1 will not result in direct or indirect adverse effects to pool habitat. Therefore, there will not be cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Alternatives 2, 3, 4, and 5:

Alternatives 2, 3, 4, and 5 would not result in cumulative decreases in pool habitat with activities listed in Appendix C except where discussed below:

- **Alternative 2:** Past timber-harvest activities adjacent to the Little Malheur River and Camp Creek may have resulted in a reduction in pool habitat due to salvage of trees in riparian areas. Reduction of the number of pools in the Little Malheur River and Camp Creek due salvaging of dead trees < 20" dbh will be cumulative with reductions from past harvest activities.

Embeddedness / Fine Sediment

Alternative 1:

Alternative 1 will not result in direct or indirect adverse effects to aquatic habitat due to increasing fine sediment levels above current existing levels. Therefore, there will not be cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Alternatives 2, 3, 4, and 5:

Alternatives 2, 3, 4, and 5 would not result in cumulative increases in embeddedness or fine sediment with activities listed in Appendix C except where discussed below:

Chapter 2 **Alternatives 2, 3, 4, and 5:** Two timber sales occurred in the Canteen Creek and Camp Creek area in 1967 and 1968. During these two sales, the current road system in the area was constructed. The logging systems for both sales were primarily ground based, using tractors to yard trees to landings. Skid trails were constructed up most Category 4 stream channels in the sale areas (see skid trail restoration discussion). The road system and skid trails have likely led to an increase in fine sediment levels in Camp Creek and the Little Malheur River. Obliterating old skid trails under Alternatives 2, 3, 4, and 5 would eliminate continuing fine sediment impacts from timber harvest activities that occurred in the 1960's. The result would be a reduction in fine sediment levels from the baseline condition.

Roads

Alternatives 2, 3, 4, and 5:

These alternatives will reduce fine sediment levels in the Little Malheur River and Camp Creek by decommissioning 15 roads in the subwatershed that have been identified as

contributing to elevated levels of fine sediment in The Little Malheur River and Camp Creek (Table A-15). Decommissioning these roads would reduce fine sediment levels in Camp Creek and the Little Malheur River below the baseline condition.

Livestock Grazing

Alternatives 2, 3, 4, and 5:

Cumulative effects with the resumption of livestock grazing are unlikely if grazing occurs after hardwoods have reached a height above browse level, bank stability has reached 90%, and bank vegetation has recovered to mid to late seral conditions.

Resuming grazing before the above conditions are met may result in cumulative effects. Banks are likely to be damaged thus resulting in increased W/D ratios, increases in fine sediment, and increases in water temperature. Recovery of stream channels will be delayed and full recovery may not occur. Increases in fine sediment resulting from too early resumption of grazing activities would likely be cumulative with short-term increases resulting from decommissioning FSR 1672479 adjacent to Camp Creek and obliteration of old skid trails.

Bank Stability

Alternative 1:

Alternative 1 will not have direct or indirect adverse effects to bank stability. Therefore, there will not be cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Alternatives 2, 3, 4, and 5:

Alternatives 2, 3, 4, and 5 will not result in direct or indirect adverse effects to bank stability. Therefore, there will be no cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Width to Depth Ratio

Alternative 1:

Alternative 1 will not have direct or indirect adverse effects to width to depth ratios. Therefore, there will be no cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Alternatives 2, 3, 4, and 5:

Alternatives 2, 3, 4, and 5 will not result in direct or indirect adverse effects to water quantity. Therefore, there will be no cumulative effects with past management, ongoing, future foreseeable activities listed in Appendix C.

Shading and Water Temperature

Alternative 1:

Alternative 1 will not have direct or indirect adverse effects to shading and stream temperatures. Therefore, there will not be cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Alternative 2:

Alternative 2 will result in a slight decrease in shading due to salvaging standing dead trees <20" dbh. However, the decrease in shading will be unlikely to result in a measurable increase in water temperatures. Therefore, there will be no cumulative effects with past management, ongoing, future foreseeable activities listed in Appendix C.

Alternatives 3, 4, and 5:

Alternatives 3, 4, and 5 will not result in direct or indirect adverse effects to shading and stream temperatures. Therefore, there will not be cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Water Quantity**Alternative 1:**

Alternative 1 will not result in adverse direct or indirect effects to water quantity. Therefore, there will not be cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Alternatives 2, 3, 4, and 5:

Alternatives 2, 3, 4, and 5 will not result in direct or indirect adverse effects to water quantity. Therefore, there will not be cumulative effects with past management, ongoing, or future foreseeable activities listed in Appendix C.

Affected Environment and Environmental Effects - Aquatic Species**Introduction**

Management Indicator Species (MIS) are species of vertebrates and invertebrates whose population changes are believed to best indicate effects of land management activities. Through the MIS concept, the total number of species found within a project area is reduced to a subset of species that collectively represent habitats, species and associated management concerns. The MIS are used to assess the maintenance of populations (the ability of a population to sustain itself naturally) and biological diversity (which includes genetic diversity, species diversity, and habitat diversity), and to assess effects on species in public demand. The Malheur Forest Plan directs analyses to focus on MIS. Aquatic MIS in the analysis area for the Monument Fire Recovery project are: redband trout (*Oncorhynchus mykiss gairdneri*), and bull trout (*Salvelinus confluentus*) (Table A-23).

An endangered species is an animal or plant species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range. A threatened species is an animal or plant species listed under the Endangered Species Act likely to become endangered within the foreseeable future throughout all or a significant portion of its range. A sensitive species is an animal or plant species identified by the Regional Forester for which species viability is a concern either a) because of current or predicted downward trend in population numbers or density, or b) because of current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Aquatic threatened, endangered, and sensitive species in the analysis area for the Monument Fire Recovery project are: bull trout (*Salvelinus confluentus*) - threatened; redband trout (*Oncorhynchus mykiss gairdneri*) - sensitive; Malheur mottled sculpin (*Cottus bendirei*) - sensitive; and Columbia spotted frogs (*Rana luteiventris*) - sensitive (Table A-23). Proposed critical habitat for bull trout is also present in the analysis area (Table A-23). Effects to aquatic threatened, endangered, and sensitive species; and proposed critical habitat are analyzed in the Monument Fire Recovery Project Biological Evaluation for aquatic species (Appendix C) and a summary of that analysis is included in this EIS.

Table A-23. Aquatic Species with Special Management Status Present or Suspected in the Project Area.

| Aquatic Species | Management Status | Stream | Distribution | Habitat |
|---|-------------------|-------------------|--------------|---------|
| Redband trout <i>Oncorhynchus mykiss</i> | MIS, R6S | Little Malheur R. | P | P |
| | | Camp Creek | P | P |
| | | Hunter Creek | P | P |
| | | Spring Creek | NP | NP |
| Bull trout <i>Salvelinus confluentus</i> | MIS, ESA-T | Little Malheur R. | NP-H | PCH |
| | | Camp Creek | NP | NP |
| | | Hunter Creek | NP | NP |
| | | Spring Creek | NP | NP |
| Malheur mottled sculpin <i>Cottus bendirei</i> | R6S | Little Malheur R. | S | P |
| | | Camp Creek | S | P |
| | | Hunter Creek | NP | NP |
| | | Spring Creek | NP | NP |
| Columbia spotted frog <i>Rana luteiventris</i> | R6S | Little Malheur R. | S | P |
| | | Camp Creek | S | P |
| | | Hunter Creek | S | P |
| | | Spring Creek | S | P |

*Management Status: MIS = Forest Plan management indicator species, R6S = Region 6 sensitive species, ESA-T = Threatened. Distribution: P=present, NP=not present, H=historical occurrence, S=suspected. Habitat: P=present, NP=not present, PCH=proposed critical habitat.

Redband Trout (Management Indicator Species, Region 6 Sensitive Species)

Summary of Effects and Determination

Alternative 1 (No Action):

Adverse effects to aquatic species are likely to occur in the Little Malheur and Camp Creek drainages of the Little Malheur River watershed because of current and foreseeable conditions. Fine sediment levels are above threshold for effects to redband trout and will likely reduce spawning success and survival. Fine sediment levels are high enough to fill interstitial spaces thus eliminating winter habitat for juvenile redband trout. Filling of interstitial spaces with fine sediment will also eliminate habitat for many macroinvertebrates thus reducing food supplies for fish. Pool habitat will also decline in the short-term due to filling of pools by fine sediment reducing habitat for adult redband trout. High levels of fine sediment will also impact spawning habitat and spawning success will be lowered.

Fine sediment levels are likely to start declining in three to five years when groundcover recovers to pre-fire conditions. As this occurs, habitat for the redband trout population will begin to recover to pre-fire levels. Redband populations in the Little Malheur River and Camp Creek will likely rebound from adverse effects from the 2002 fire relatively quickly due to their mobility and lack of migration barriers.

Alternative 1 will result in elevated fine sediment levels compared to natural levels because old skid trails will not be obliterated and FSR 1672479 will not be decommissioned. The old

skid trails and FSR 1672479 are chronic sources of fine sediment that have contributed to elevated levels of fine sediment in Camp Creek and the Little Malheur River.

- **Determination:** Alternative 1 may impact individual redband trout or their habitat in the Little Malheur River Watershed but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH).

Alternative 1 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore, effects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 1 will not impact individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 2:

Removing standing dead trees < 20" dbh from RHCAs will result in a reduction in the amount of woody debris levels in the Little Malheur River and Camp Creek in the Little Malheur River watershed. An estimated 2 pools in the Little Malheur River will reduce pool habitat and 18 pools in Camp Creek compared to Alternative 1. This would result in a reduction of 0.7 pools per mile in the Little Malheur River and 5.6 pools per mile in Camp Creek. However, since Forest Plan standard for LWD will be met for the next 100 years in both the Little Malheur River (Figure 21, Map Section) and Camp Creek (Figure 21, Map Section) it is likely that the Forest Plan standard for pools will also be met.

Salvaging standing dead trees < 20" dbh from RHCAs will also reduce cover and habitat complexity compared to Alternative 1. Reducing the amount of woody debris would also reduce the amount of woody debris available to buffer increases in fine sediment from future large erosion events.

Predicted erosion rates will be decreased by an estimated 10% as a result of increases in ground cover resulting from salvage activities compared to Alternative 1. This will result in a reduction of adverse impacts in 2004 to 0.7 miles of aquatic habitat in the Little Malheur River downstream from the confluence of Camp Creek based on our sediment impact model compared to Alternative 1.

Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. The old skid trails and FSR 1672479 are chronic sources of fine sediment and have likely resulted in elevation of fine sediment levels above background levels. However, there is potential for increases in fine sediment for 2 to 3 years following obliteration of the old skid trails because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Alternative 2 will result in reducing existing shade levels along Camp Creek and the Little Malheur River by about 1% compared to Alternative 1 due to the removal of standing dead trees < 20" dbh. It is unlikely that recovery of water temperatures to pre-fire levels will differ between Alternative 1 and Alternative 2.

- **Determination:** Alternative 2 may impact individual redband trout or their habitat in the Little Malheur River Watershed, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH/BI).

Alternative 2 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore affects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 2 will have no impact to individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 3:

Predicted erosion rates will be decreased by an estimated 10% as a result of increases in ground cover resulting from salvage activities compared to Alternative 1. This will result in a reduction of adverse impacts in 2004 to 0.5 miles of aquatic habitat compared to Alternative 1 in the Little Malheur River downstream from the confluence of Camp Creek based on our sediment impact model.

Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Pools and habitat complexity under Alternative 3 would be similar to Alternative 1 because removal of standing dead trees < 20" dbh in RHCA's would not occur. Alternative 3 will not adversely impact channel stability, physical habitat, or water quality elements.

- **Determination:** Alternative 3 may impact redband trout in the short-term. Alternative 3 will have a beneficial impact on redband trout and their habitat in the long-term in the Little Malheur River Watershed (MIH/BI).

Alternative 3 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore affects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 3 will have no impact to individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 4:

Predicted erosion rates will be decreased by an estimated 10% as a result of increases in ground cover ensuing from salvage activities compared to Alternative 1. This will result in a reduction of adverse impacts in 2004 to 0.5 miles of aquatic habitat in the Little Malheur River downstream from the confluence of Camp Creek based on our sediment impact model compared to Alternative 1.

Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediment levels above background levels. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Pools and habitat complexity under Alternative 4 would be similar to Alternative 1 because removal of standing dead trees < 20" dbh in RHCA's would not occur. Alternative 4 will not adversely impact channel stability, physical habitat, or water quality elements.

- **Determination:** Alternative 4 may impact redband trout in the short-term. Alternative 4 will have a beneficial impact on redband trout and their habitat in the long-term in the Little Malheur River Watershed (MIIH/BI).

Alternative 4 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore effects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 4 will not impact individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 5:

Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

- **Determination:** Alternative 5 may impact redband trout in the short-term. Alternative 5 will have a beneficial impact on redband trout and their habitat in the long-term in the Little Malheur River Watershed (MIIH/BI).

Alternative 5 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore, affects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 5 will have no impact to individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Malheur Mottled Sculpin (Region 6 Sensitive Species)

Summary of Effects and Determination

Alternative 1:

Of the two fish species with special management status currently present in the analysis area in the Little Malheur River watershed, Malheur mottled sculpin will probably be most impacted by current post-fire conditions due to large increases in fine sediment resulting from the 2002 fire. Cobble substrate serves as spawning habitat, and rearing habitat for juvenile and adult sculpins. Habitat for sculpin will be eliminated where interstitial spaces between cobble substrate are filled.

Based on our sediment impact model, adverse effects to mottled sculpins are likely due to the amount of fine sediment that will be present in Camp Creek, and the Little Malheur River. In 2003, interstitial spaces between cobble substrate are likely be filled by fine sediment in Camp Creek and the Little Malheur above Camp Creek. Interstitial spaces between cobble substrate may be filled by fine sediment for up to 27.8 miles in the Little Malheur River below Camp Creek.

Effects from fine sediment will begin to decline in 2004. Enough fine sediment could be eroded from the burned area to fill interstitial spaces between cobble substrate in Camp Creek and the Little Malheur above Camp Creek. Mottled sculpin habitat in the Little Malheur River below Camp Creek may be impacted for up to 5.2 miles. Erosion rates will likely return to pre-fire levels sometime in 2005 through 2007. It will likely take an

additional two years (from 2007 to 2009) for fine sediment levels in the Little Malheur River to return to pre-fire levels.

While mottled sculpins are relatively long lived (sculpin live about 5 years), the timeframe for impacts to mottled sculpin habitat in Camp Creek and the Little Malheur River above Camp Creek are potentially longer than 1 generation. Therefore, there is potential for the sculpin population to experience a major decline in these areas due to lack of successful reproduction, and lack of habitat for juveniles and adults.

Failure or delaying for another environmental analysis, the decommissioning of FSR 1672479 will impact aquatic habitat due to elevated levels of fine sediment in Camp Creek. This road has essentially been abandoned and is contributing fine sediment to Camp Creek in its present condition.

By not obliterating old skid trails in the Camp Creek drainage, an opportunity to reduce chronic inputs of fine sediment into Camp Creek and the Little Malheur River will be missed. These old skid trails show evidence of continual erosion since their construction and use in the late 1960s. These skid trails are located adjacent to and in some places within Category 4 stream channels. Failure to obliterate these skid trails will lengthen the recovery process of Camp Creek and to a lesser extent the Little Malheur River due to elevated levels of fine sediment.

- **Determination:** Alternative 1 may impact individual Malheur mottled sculpin or their habitat in the Little Malheur River Watershed due to elevated levels of fine sediment resulting from the 2002 fire. However, impacts would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species at the watershed scale (MIIH).

Alternative 1 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to Malheur mottled sculpin in the Upper North Fork Malheur River Watershed are unlikely.

- **Determination:** Alternative 1 will have no impact to individual Malheur mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 2:

Compared to Alternative 1, Alternative 2 will reduce impacts to sculpin from increases in fine sediment resulting from the 2002 fire. Based on our sediment impact model, in 2004 an estimated 4.5 miles of the Little Malheur River below Camp Creek will be adversely impacted under Alternative 2 from erosion from the fire area compared to 5.2 miles under Alternative 1. Impacts to sculpin habitat from fire related sediment would be the same as Alternative 1 after 2004 due to recovery of herbaceous ground cover.

Alternative 2 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided because old skid trails will be restored and FSR 1672479 will be decommissioned. The old skid trails and FSR 1672479 are chronic sources of fine sediment and have likely resulted in elevation of fine sediment levels above background levels.

Reductions in woody debris, pool habitat, cover, and habitat complexity due to the proposal to salvage dead trees < 20" dbh in RHCA's, will have less of an effect to sculpin than redband trout. These features of aquatic habitat are relatively less important to sculpin compared to the availability of cobble substrate with low levels of embedment.

- **Determination:** Alternative 2 may impact individual Malheur mottled sculpin or their habitat in the Little Malheur River Watershed, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species in the short-term. Alternative 2 will have a beneficial impact on Malheur Mottled sculpin and their habitat in the long-term (MIIH/BI).

Alternative 2 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to Malheur Mottled sculpin in the North Fork watershed are unlikely.

- **Determination:** Alternative 2 will have no impact to individual Malheur Mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 3:

Compared to Alternative 1, Alternative 3 will reduce impacts to sculpin from increases in fine sediment resulting from the 2002 fire. Based on our sediment impact model, in 2004 an estimated 4.7 miles of the Little Malheur River will be adversely impacted under Alternative 3 from erosion from the fire area compared to 5.2 miles under Alternative 1. Impacts to sculpin habitat from fire related sediment would be the same as Alternative 1 after 2004 due to recovery of herbaceous ground cover.

Alternative 3 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided. Lower levels of sediment will ensue because old skid trails will be restored and FSR 1672479 will be decommissioned. Old skid trails and FSR 1672479 are chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels.

Alternative 3 will result in similar levels of woody debris, pool habitat, cover, and habitat complexity as Alternative 1 because dead trees < 20" dbh would not be salvaged from RHCAs.

- **Determination:** Alternative 3 may impact individual Malheur mottled sculpin, or their habitat in the Little Malheur River Watershed. Alternative 3 will have a beneficial impact on Malheur Mottled sculpin and their habitat in the long-term (MIIH/BI).

Alternative 3 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to Malheur mottled sculpin in the North Fork watershed are unlikely.

- **Determination:** Alternative 3 will not impact individual Malheur mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 4:

Compared to Alternative 1, Alternative 4 will reduce impacts to sculpin from increases in fine sediment resulting from the 2002 fire. Based on our sediment impact model, in 2004 an estimated 4.7 miles of the Little Malheur River will be adversely impacted under Alternative 4 from erosion resulting from the fire area compared to 5.2 miles under Alternative 1. Impacts to sculpin habitat from fire related sediment would be the same as Alternative 1 after 2004 due to recovery of herbaceous ground cover.

Alternative 4 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided because old skid trails will be restored and FSR 1672479 will be decommissioned. Old skid trails and FSR 1672479 are chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels.

Alternative 4 will result in the similar levels of woody debris, pool habitat, cover, and habitat complexity as Alternative 1 because dead trees < 20" dbh would not be salvaged from RHCAs.

- **Determination:** Alternative 4 may impact individual Malheur mottled sculpin or their habitat in the Little Malheur River Watershed. Alternative 4 will have a beneficial impact on Malheur Mottled sculpin and their habitat in the long-term (MIIH/BI).

Alternative 4 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to Malheur mottled sculpin in the North Fork watershed are unlikely.

- **Determination:** Alternative 4 will have no impact to individual Malheur mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 5:

Alternative 5 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediment levels above background levels. Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Alternative 5 will result in the similar levels of woody debris, pool habitat, cover, and habitat complexity as Alternative 1 because dead trees < 20" dbh would not be salvaged from RHCAs.

- **Determination:** Alternative 5 may impact individual Malheur mottled sculpin or their habitat in the Little Malheur River Watershed. Alternative 5 will have a beneficial impact on Malheur Mottled sculpin and their habitat in the long-term (MIIH/BI).

Alternative 5 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 5 will have no impact to individual Malheur mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Bull Trout (Management Indicator Species, Threatened Species)

Summary of Effects and Determination

Alternative 1 (No Action):

Bull trout are not currently present in the upper Little Malheur River watershed. Migratory habitat for fluvial bull trout is present in the lower portion of the Little Malheur River and bull trout have been documented in the lower mile of the Little Malheur River. Alternative 1 will result in elevated fine sediment levels above natural levels because old skid trails will not be obliterated and FSR 1672479 will not be decommissioned. The old skid trails and FSR 1672479 are chronic sources of fine sediment. However, pre-fire levels of fine sediment were generally below the 20% threshold level and would not likely preclude reestablishment of a reproducing bull trout population in the upper Little Malheur River. Fine sediment from these sources would also not likely affect habitat for migrating bull trout in the lower Little Malheur River due to the distances involved.

- **Determination:** Alternative 1 will have no effect on bull trout or their current habitat in the Little Malheur River Watershed (NE).

Alternative 1 will not affect channel stability, physical habitat, or water quality elements. Therefore affects to bull trout in the upper North Fork watershed are unlikely.

- **Determination:** Alternative 1 will have no effect on bull trout or their habitat in the Upper North Fork Malheur River Watershed (NE).

Alternative 2:

Bull trout are not currently present in the upper Little Malheur River watershed.

Reestablishment of a resident population of bull trout depends on lowering of water temperatures by about 20°F below pre-fire levels. Water temperatures in the project area are likely to begin declining in about 10 to 15 years when recovery of hardwoods from effects of the 2002 fire is likely to occur. Activities proposed under Alternative 2 will result in a slight reduction in existing shading due to the removal of standing dead trees, but will not impact recovery of shading provided by future streamside vegetation. Therefore, Alternative 2 will not preclude the reestablishment of bull trout.

There will likely be two fewer pools in the lower reaches of the Little Malheur River compared to Alternative 1 due to the salvage of trees < 20" dbh from the adjacent RHCA. However, sufficient levels of LWD will be present to create enough pools to meet the Forest Plan standard.

Alternative 2 will result in fine sediment levels lower than Alternative 1 once the effects from the 2002 fire have subsided because old skid trails will be obliterated and FSR 1672479 will be decommissioned. Old skid trails and FSR 1672479 are chronic sources of fine sediment. Reducing levels of fine sediment in Camp Creek and the Little Malheur River would improve spawning success of a reestablished bull trout population.

- **Determination:** Alternative 2 will have no effect on bull trout or their current habitat in the Little Malheur River Watershed (NE).

Alternative 2 will not affect channel stability, physical habitat, or water quality elements. Therefore affects to bull trout in the upper North Fork watershed are unlikely.

- **Determination:** Alternative 2 will have no effect on bull trout, or their habitat in the Upper North Fork Malheur River Watershed (NE).

Alternatives 3, 4, and 5:

Bull trout are not currently present in the upper Little Malheur River watershed.

Reestablishment of a resident population of bull trout depends on lowering of water temperatures by about 20°F below baseline levels. Water temperatures in the project area are likely to begin declining in about 10 to 15 years when recovery of hardwoods from the effects of the 2002 fire is likely to occur. Activities proposed under Alternatives 3, 4, and 5 will not adversely impact channel stability, physical habitat, or water quality elements. Therefore, Alternatives 3, 4, and 5 will not preclude reestablishment of bull trout.

Alternatives 3, 4, and 5 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided. This will occur because old skid trails will be obliterated and FSR 1672479 will be decommissioned. Old skid trails and FSR 1672479 are chronic sources of fine sediment. Reducing levels of fine sediment in Camp Creek and the Little Malheur River would improve the spawning success of a reestablished bull trout population.

- **Determination:** Alternatives 3, 4, and 5 will have no effect on bull trout or their current habitat in the Little Malheur River Watershed.

Alternatives 3, 4, and 5 will not affect channel stability, physical habitat, or water quality elements. Therefore effects to bull trout in the upper North Fork watershed are unlikely (NE).

- **Determination:** Alternatives 3, 4, and 5 will have no effect on bull trout or their habitat in the Upper North Fork Malheur River Watershed (NE).

Columbia Spotted Frog (Region 6 Sensitive Species)

Summary of Effects and Determination

Alternative 1 (No Action):

Habitat for Columbia spotted frogs in the project area would recover from effects of the 2002 fire at natural rates. Habitat would recover relatively quickly along lower reaches of the Little Malheur River due to low effects of fire on streamside vegetation. Recovery of habitat along the lower reaches of Camp Creek will take longer due to the severe effects of the 2002 fire on streamside vegetation. Spotted frog populations will rebound to pre-fire conditions as habitat recovers.

- **Determination:** Alternative 1 will not impact individual Columbia spotted frogs or their habitat in the Little Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Spotted frogs were unlikely to have been impacted by the 2002 fire in the Upper North Fork Malheur River Watershed because the fire occurred outside of potential habitat areas.

- **Determination:** Alternative 1 will not impact individual Columbia spotted frogs or their habitat in the Upper North Fork Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Alternative 2:

Generally, proposed activities will not occur in habitat for spotted frogs (streams, stream margins, ponds, and springs). However, adverse impacts to individual Columbia spotted frogs may occur during felling and yarding activities in RHCAs. Directional felling of trees away from stream channels and use of helicopters to yard trees will mitigate potential impacts to habitat adjacent streams. Potential impacts to habitat associated with ponds, springs, and seeps will be protected with no-cut areas. Ponds and large springs in salvage activity areas will be protected from disturbance with 100 ft no cut buffers. Smaller springs and seeps in salvage activity areas will be protected with 50 ft no cut buffers.

- **Determination:** Alternative 2 may impact individual Columbia spotted frogs or their habitat in the Little Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH).

Habitat for Columbia spotted frogs is not present in the Upper North Fork Malheur River Watershed portion of the project area. Salvage activities are not planned for RHCAs in the Swamp Creek subwatershed under Alternative 2. Adverse effects to spotted frog habitat in Spring Creek outside of the project area is not expected to occur due to low erosion potential on these units and the current condition of RHCAs.

- **Determination:** Alternative 2 will not impact individual Columbia spotted frogs or their habitat in the Upper North Fork Malheur River Watershed and will not

contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Alternatives 3 and 4:

Potential impacts to habitat associated with riparian areas and stream channels will be protected from disturbance by foregoing salvage activities in RHCAs. Potential impacts to habitat associated with ponds, springs, and seeps will be protected with no-cut areas. Ponds and large springs in salvage activity areas will be protected from disturbance with 100 ft no cut buffers. Smaller springs and seeps in salvage activity areas will be protected with 50 ft no cut buffers.

- **Determination:** Alternatives 3 and 4 will not impact individual Columbia spotted frogs or their habitat in the Little Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Habitat for Columbia spotted frogs is not present in the Upper North Fork Malheur River Watershed portion of the project area. Salvage activities are not planned for RHCAs in the Swamp Creek subwatershed under Alternatives 3 and 4. Adverse effects to spotted frog habitat in Spring Creek outside of the project area is not expected to occur due to the low erosion potential on these units and current condition of RHCAs. Therefore, effects from activities proposed in this portion of the project area will not extend beyond the project area.

- **Determination:** Alternatives 3 and 4 will not impact individual Columbia spotted frogs or their habitat in the Upper North Fork Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to population or species (NI).

Alternative 5:

Activities proposed will not occur in spotted frog habitat therefore adverse impacts to spotted frogs will not occur in the Little Malheur River Watershed.

- **Determination:** Alternative 5 will not impact individual Columbia spotted frogs or their habitat in the Little Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Activities proposed will not occur in spotted frog habitat therefore adverse impacts to spotted frogs will not occur in the Upper North Fork Malheur River Watershed.

- **Determination:** Alternative 5 will not impact individual Columbia spotted frogs or their habitat in the Upper North Fork Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Proposed Critical Habitat for Bull Trout

Summary of Effects and Determination

Alternative 1(No Action):

Little Malheur River Watershed: Alternative 1 will slow the recovery of proposed critical habitat for bull trout in the Little Malheur River. Fine sediment levels in the Little Malheur River will remain elevated due chronic inputs of fine sediment from old skid trails and FSR 1672479 in the Camp Creek drainage. Prior to the 2002 fire fine sediment levels in the Little Malheur River were between 13 and 21% and would be rated as functioning at risk.

- **Determination:** Alternative 1 would not result in adverse modification (NAM) to proposed critical habitat for bull trout for the Columbia distinct population segment (DPS).

Upper North Fork Malheur River Watershed: Alternative 1 will not affect channel stability, physical habitat, or water quality elements. Therefore, effects to proposed critical habitat for bull trout in the North Fork Malheur River watershed are unlikely.

- **Determination:** Alternative 1 would not result in adverse modification (NAM) to proposed critical habitat for bull trout for the Columbia DPS.

Alternative 2:

Little Malheur River Watershed: Salvaging standing dead trees < 20" dbh from RHCAs will result in a reduction in the amount of woody debris levels in the Little Malheur River and Camp Creek. Pool habitat will be reduced by an estimated two pools in the Little Malheur River and 18 pools in Camp Creek compared to Alternative 1. This will result in a reduction of 0.7 pools per mile in the Little Malheur River and 5.6 pools per mile in Camp Creek. However, since Forest Plan standard for LWD will be met for the next 100 years in both the Little Malheur River (Figure 21, Map Section) and Camp Creek (Figure 21, Map Section) it is likely that the Forest Plan standard for pools will also be met.

Salvaging standing dead trees < 20" dbh from RHCAs will also reduce cover and habitat complexity compared to Alternative 1. Reducing the amount of woody debris would also reduce the amount of fine sediment trapped and incorporated into stream banks.

Alternative 2 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have Summary of Effects and Determination

Alternative 1 (No Action):

Adverse effects to aquatic species are likely to occur in the Little Malheur and Camp Creek drainages of the Little Malheur River watershed because of current and foreseeable conditions. Fine sediment levels are above threshold for effects to redband trout and will likely reduce spawning success and survival. Fine sediment levels are high enough to fill interstitial spaces thus eliminating winter habitat for juvenile redband trout. Filling of interstitial spaces with fine sediment will also eliminate habitat for many macroinvertebrates thus reducing food supplies for fish. Pool habitat will also decline in the short-term due to filling of pools by fine sediment reducing habitat for adult redband trout. High levels of fine sediment will also impact spawning habitat and spawning success will be lowered.

Fine sediment levels are likely to start declining in three to five years when groundcover recovers to pre-fire conditions. As this occurs, habitat for the redband trout population will begin to recover to pre-fire levels. Redband populations in the Little Malheur River and Camp Creek will likely rebound from adverse effects from the 2002 fire relatively quickly due to their mobility and lack of migration barriers.

Alternative 1 will result in elevated fine sediment levels compared to natural levels because old skid trails will not be obliterated and FSR 1672479 will not be decommissioned. The old skid trails and FSR 1672479 are chronic sources of fine sediment that have contributed to elevated levels of fine sediment in Camp Creek and the Little Malheur River.

- **Determination:** Alternative 1 **may impact** individual redband trout or their habitat in the Little Malheur River Watershed **but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species** (MIIH).

Alternative 1 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore, effects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 1 will have **no impact** on individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 2:

Removing standing dead trees < 20" dbh from RHCAs will result in a reduction in the amount of woody debris levels in the Little Malheur River and Camp Creek in the Little Malheur River watershed. An estimated 2 pools in the Little Malheur River will reduce pool habitat and 18 pools in Camp Creek compared to Alternative 1. This would result in a reduction of 0.7 pools per mile in the Little Malheur River and 5.6 pools per mile in Camp Creek. However, since Forest Plan standard for LWD will be met for the next 100 years in both the Little Malheur River (Figure 21, Map Section) and Camp Creek (Figure 21, Map Section) it is likely that the Forest Plan standard for pools will also be met.

Salvaging standing dead trees < 20" dbh from RHCAs will also reduce cover and habitat complexity compared to Alternative 1. Reducing the amount of woody debris would also reduce the amount of woody debris available to buffer increases in fine sediment from future large erosion events.

Predicted erosion rates will be decreased by an estimated 10% as a result of increases in ground cover resulting from salvage activities compared to Alternative 1. This will result in a reduction of adverse impacts in 2004 to 0.7 miles of aquatic habitat in the Little Malheur River downstream from the confluence of Camp Creek based on our sediment impact model compared to Alternative 1.

Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. The old skid trails and FSR 1672479 are chronic sources of fine sediment and have likely resulted in elevation of fine sediment levels above background levels. However, there is potential for increases in fine sediment for 2 to 3 years following obliteration of the old skid trails because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Alternative 2 will result in reducing existing shade levels along Camp Creek and the Little Malheur River by about 1% compared to Alternative 1 due to the removal of standing dead trees < 20" dbh. It is unlikely that recovery of water temperatures to pre-fire levels will differ between Alternative 1 and Alternative 2.

- **Determination:** Alternative 2 **may impact** individual redband trout or their habitat in the Little Malheur River Watershed, **but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species in the short-term.** Alternative 2 will have a **beneficial impact** on redband trout and their habitat in the long-term (MIIH/BI).

Alternative 2 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore, effects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 2 will have **no impact** on individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 3:

Predicted erosion rates will be decreased by an estimated 10% as a result of increases in ground cover resulting from salvage activities compared to Alternative 1. This will result in a reduction of adverse impacts in 2004 to 0.5 miles of aquatic habitat compared to Alternative 1 in the Little Malheur River downstream from the confluence of Camp Creek based on our sediment impact model.

Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Pools and habitat complexity under Alternative 3 would be similar to Alternative 1 because removal of standing dead trees < 20" dbh in RHCAs would not occur. Alternative 3 will not adversely impact channel stability, physical habitat, or water quality elements.

- **Determination:** Alternative 3 **may impact** individual redband trout or their habitat in the Little Malheur River Watershed, **but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species in the short-term.** Alternative 3 will have a **beneficial impact** on redband trout and their habitat in the long-term (MIIH/BI).

Alternative 3 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore, affects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 3 will have **no impact** on individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 4:

Predicted erosion rates will be decreased by an estimated 10% as a result of increases in ground cover ensuing from salvage activities compared to Alternative 1. This will result in a reduction of adverse impacts in 2004 to 0.5 miles of aquatic habitat in the Little Malheur River downstream from the confluence of Camp Creek based on our sediment impact model compared to Alternative 1.

Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediment levels above background levels. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Pools and habitat complexity under Alternative 4 would be similar to Alternative 1 because removal of standing dead trees < 20" dbh in RHCAs would not occur. Alternative 4 will not adversely impact channel stability, physical habitat, or water quality elements.

- **Determination:** Alternative 4 **may impact** individual redband trout or their habitat in the Little Malheur River Watershed, **but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species in**

the short-term. Alternative 4 will have a **beneficial impact** on redband trout and their habitat in the long-term (MIIH/BI).

Alternative 4 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore, effects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 4 will have **no impact** on individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 5:

Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

- **Determination:** Alternative 5 **may impact** individual redband trout or their habitat in the Little Malheur River Watershed, **but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species in the short-term.** Alternative 5 will have a **beneficial impact** on redband trout and their habitat in the long-term (MIIH/BI).

Alternative 5 will not affect channel stability, physical habitat, or water quality elements in the Spring Creek drainage of the Upper North Fork Malheur River watershed. Therefore, effects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 5 will have **no impact** on individual redband trout or their habitat in the Upper North Fork Malheur River Watershed (NI).

Malheur Mottled Sculpin (Region 6 Sensitive Species)

Summary of Effects and Determination

Alternative 1:

Of the two fish species with special management status currently present in the analysis area in the Little Malheur River watershed, Malheur mottled sculpin will probably be most impacted by current post-fire conditions due to large increases in fine sediment resulting from the 2002 fire. Cobble substrate serves as spawning habitat, and rearing habitat for juvenile and adult sculpins. Habitat for sculpin will be eliminated where interstitial spaces between cobble substrate are filled.

Based on our sediment impact model, adverse effects to mottled sculpins are likely due to the amount of fine sediment that will be present in Camp Creek, and the Little Malheur River. In 2003, interstitial spaces between cobble substrate are likely to be filled by fine sediment in Camp Creek and the Little Malheur above Camp Creek. Interstitial spaces between cobble substrate may be filled by fine sediment for up to 27.8 miles in the Little Malheur River below Camp Creek.

Effects from fine sediment will begin to decline in 2004. Enough fine sediment could be eroded from the burned area to fill interstitial spaces between cobble substrate in Camp Creek and the Little Malheur above Camp Creek. Mottled sculpin habitat in the Little Malheur River below Camp Creek may be impacted for up to 5.2 miles. Erosion rates will likely return to pre-fire levels sometime in 2005 through 2007. It will likely take an

additional two years (from 2007 to 2009) for fine sediment levels in the Little Malheur River to return to pre-fire levels.

While mottled sculpins are relatively long lived (sculpin live about 5 years), the timeframe for impacts to mottled sculpin habitat in Camp Creek and the Little Malheur River above Camp Creek are potentially longer than 1 generation. Therefore, there is potential for the sculpin population to experience a major decline in these areas due to lack of successful reproduction, and lack of habitat for juveniles and adults.

Failure or delaying for another environmental analysis, the decommissioning of FSR 1672479 will impact aquatic habitat due to elevated levels of fine sediment in Camp Creek. This road has essentially been abandoned and is contributing fine sediment to Camp Creek in its present condition.

By not obliterating old skid trails in the Camp Creek drainage, an opportunity to reduce chronic inputs of fine sediment into Camp Creek and the Little Malheur River will be missed. These old skid trails show evidence of continual erosion since their construction and use in the late 1960s. These skid trails are located adjacent to and in some places within Category 4 stream channels. Failure to obliterate these skid trails will lengthen the recovery process of Camp Creek and to a lesser extent the Little Malheur River due to elevated levels of fine sediment.

- **Determination:** Alternative 1 **may impact** individual Malheur mottled sculpin or their habitat in the Little Malheur River Watershed due to elevated levels of fine sediment resulting from the 2002 fire. However, impacts **would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species at the watershed scale** (MIIH).

Alternative 1 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to Malheur mottled sculpin in the Upper North Fork Malheur River Watershed are unlikely.

- **Determination:** Alternative 1 will have **no impact** to individual Malheur mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 2:

Compared to Alternative 1, Alternative 2 will reduce impacts to sculpin from increases in fine sediment resulting from the 2002 fire. Based on our sediment impact model, in 2004 an estimated 4.5 miles of the Little Malheur River below Camp Creek will be adversely impacted under Alternative 2 from erosion from the fire area compared to 5.2 miles under Alternative 1. Impacts to sculpin habitat from fire related sediment would be the same as Alternative 1 after 2004 due to recovery of herbaceous ground cover.

Alternative 2 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided because old skid trails will be restored and FSR 1672479 will be decommissioned. The old skid trails and FSR 1672479 are chronic sources of fine sediment and have likely resulted in elevation of fine sediment levels above background levels.

Reductions in woody debris, pool habitat, cover, and habitat complexity due to the proposal to salvage dead trees < 20" dbh in RHCA's, will have less of an effect to sculpin than redband trout. These features of aquatic habitat are relatively less important to sculpin compared to the availability of cobble substrate with low levels of embedment.

- **Determination:** Alternative 2 **may impact** individual Malheur mottled sculpin or their habitat in the Little Malheur River Watershed, **but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species in the short-term.** Alternative 2 will have a **beneficial impact** on Malheur Mottled sculpin and their habitat in the long-term (MIIH/BI).

Alternative 2 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to Malheur Mottled sculpin in the North Fork watershed are unlikely.

- **Determination:** Alternative 2 will have **no impact** to individual Malheur Mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 3:

Compared to Alternative 1, Alternative 3 will reduce impacts to sculpin from increases in fine sediment resulting from the 2002 fire. Based on our sediment impact model, in 2004 an estimated 4.7 miles of the Little Malheur River will be adversely impacted under Alternative 3 from erosion from the fire area compared to 5.2 miles under Alternative 1. Impacts to sculpin habitat from fire related sediment would be the same as Alternative 1 after 2004 due to recovery of herbaceous ground cover.

Alternative 3 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided. Lower levels of sediment will ensue because old skid trails will be restored and FSR 1672479 will be decommissioned. Old skid trails and FSR 1672479 are chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels.

Alternative 3 will result in similar levels of woody debris, pool habitat, cover, and habitat complexity as Alternative 1 because dead trees < 20" dbh would not be salvaged from RHCAs.

- **Determination:** Alternative 3 **may impact** individual Malheur mottled sculpin or their habitat in the Little Malheur River Watershed, **but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species in the short-term.** Alternative 3 will have a **beneficial impact** on Malheur Mottled sculpin and their habitat in the long-term (MIIH/BI).

Alternative 3 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to Malheur mottled sculpin in the North Fork watershed are unlikely.

- **Determination:** Alternative 3 will have **no impact** to individual Malheur Mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 4:

Compared to Alternative 1, Alternative 4 will reduce impacts to sculpin from increases in fine sediment resulting from the 2002 fire. Based on our sediment impact model, in 2004 an estimated 4.7 miles of the Little Malheur River will be adversely impacted under Alternative 4 from erosion resulting from the fire area compared to 5.2 miles under Alternative 1. Impacts to sculpin habitat from fire related sediment would be the same as Alternative 1 after 2004 due to recovery of herbaceous ground cover.

Alternative 4 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided because old skid trails will be restored and FSR 1672479 will be decommissioned. Old skid trails and FSR 1672479 are chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels.

Alternative 4 will result in the similar levels of woody debris, pool habitat, cover, and habitat complexity as Alternative 1 because dead trees < 20" dbh would not be salvaged from RHCAs.

- **Determination:** Alternative 4 **may impact** individual Malheur mottled sculpin or their habitat in the Little Malheur River Watershed, **but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species in the short-term.** Alternative 4 will have a **beneficial impact** on Malheur Mottled sculpin and their habitat in the long-term (MIIH/BI).

Alternative 4 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to Malheur mottled sculpin in the North Fork watershed are unlikely.

- **Determination:** Alternative 4 will have **no impact** to individual Malheur mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Alternative 5:

Alternative 5 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediment levels above background levels. Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Alternative 5 will result in the similar levels of woody debris, pool habitat, cover, and habitat complexity as Alternative 1 because dead trees < 20" dbh would not be salvaged from RHCAs.

- **Determination:** Alternative 5 **may impact** individual Malheur mottled sculpin or their habitat in the Little Malheur River Watershed, **but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species in the short-term.** Alternative 5 will have a **beneficial impact** on Malheur Mottled sculpin and their habitat in the long-term (MIIH/BI).

Alternative 5 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to redband trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 5 will have **no impact** to individual Malheur mottled sculpin or their habitat in the Upper North Fork Malheur River Watershed (NI).

Bull Trout (Management Indicator Species, Threatened Species)

Summary of Effects and Determination

Alternative 1 (No Action):

Bull trout are not currently present in the upper Little Malheur River watershed. Migratory habitat for fluvial bull trout is present in the lower portion of the Little Malheur River and bull trout have been documented in the lower mile of the Little Malheur River. Alternative 1 will result in elevated fine sediment levels above natural levels because old skid trails will not be obliterated and FSR 1672479 will not be decommissioned. The old skid trails and FSR 1672479 are chronic sources of fine sediment. However, pre-fire levels of fine sediment were generally below the 20% threshold level and would not likely preclude reestablishment of a reproducing bull trout population in the upper Little Malheur River. Fine sediment from

these sources would also not likely affect habitat for migrating bull trout in the lower Little Malheur River due to the distances involved.

- **Determination:** Alternative 1 will have **no effect** on bull trout or their current habitat in the Little Malheur River Watershed (NE).

Alternative 1 will not affect channel stability, physical habitat, or water quality elements. Therefore, effects to bull trout in the upper North Fork watershed are unlikely.

- **Determination:** Alternative 1 will have **no effect** on bull trout or their habitat in the Upper North Fork Malheur River Watershed (NE).

Alternative 2:

Bull trout are not currently present in the upper Little Malheur River watershed.

Reestablishment of a resident population of bull trout depends on lowering of water temperatures by about 20°F below pre-fire levels. Water temperatures in the project area are likely to begin declining in about 10 to 15 years when recovery of hardwoods from effects of the 2002 fire is likely to occur. Activities proposed under Alternative 2 will result in a slight reduction in existing shading due to the removal of standing dead trees, but will not impact recovery of shading provided by future streamside vegetation. Therefore, Alternative 2 will not preclude the reestablishment of bull trout.

There will likely be two fewer pools in the lower reaches of the Little Malheur River compared to Alternative 1 due to the salvage of trees < 20" dbh from the adjacent RHCA. However, sufficient levels of LWD will be present to create enough pools to meet the Forest Plan standard.

Alternative 2 will result in fine sediment levels lower than Alternative 1 once the effects from the 2002 fire have subsided because old skid trails will be obliterated and FSR 1672479 will be decommissioned. Old skid trails and FSR 1672479 are chronic sources of fine sediment. Reducing levels of fine sediment in Camp Creek and the Little Malheur River would improve spawning success of a reestablished bull trout population.

- **Determination:** Alternative 2 will have **no effect** on bull trout or their current habitat in the Little Malheur River Watershed (NE).

Alternative 2 will not affect channel stability, physical habitat, or water quality elements. Therefore, effects to bull trout in the upper North Fork watershed are unlikely.

- **Determination:** Alternative 2 will have **no effect** on bull trout, or their habitat in the Upper North Fork Malheur River Watershed (NE).

Alternatives 3, 4, and 5:

Bull trout are not currently present in the upper Little Malheur River watershed.

Reestablishment of a resident population of bull trout depends on lowering of water temperatures by about 20°F below baseline levels. Water temperatures in the project area are likely to begin declining in about 10 to 15 years when recovery of hardwoods from the effects of the 2002 fire is likely to occur. Activities proposed under Alternatives 3, 4, and 5 will not adversely impact channel stability, physical habitat, or water quality elements. Therefore, Alternatives 3, 4, and 5 will not preclude reestablishment of bull trout.

Alternatives 3, 4, and 5 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided. This will occur because old skid trails will be obliterated and FSR 1672479 will be decommissioned. Old skid trails and FSR 1672479 are chronic sources of fine sediment. Reducing levels of fine sediment in Camp Creek and the

Little Malheur River would improve the spawning success of a reestablished bull trout population.

- **Determination:** Alternatives 3, 4, and 5 will have **no effect** on bull trout or their current habitat in the Little Malheur River Watershed.

Alternatives 3, 4, and 5 will not affect channel stability, physical habitat, or water quality elements. Therefore, effects to bull trout in the upper North Fork watershed are unlikely (NE).

- **Determination:** Alternatives 3, 4, and 5 will have **no effect** on bull trout or their habitat in the Upper North Fork Malheur River Watershed (NE).

Columbia Spotted Frog (Region 6 Sensitive Species)

Summary of Effects and Determination

Alternative 1 (No Action):

Habitat for Columbia spotted frogs in the project area would recover from effects of the 2002 fire at natural rates. Habitat would recover relatively quickly along lower reaches of the Little Malheur River due to low effects of fire on streamside vegetation. Recovery of habitat along the lower reaches of Camp Creek will take longer due to the severe effects of the 2002 fire on streamside vegetation. Spotted frog populations will rebound to pre-fire conditions as habitat recovers.

- **Determination:** Alternative 1 will have **no impact** on individual Columbia spotted frogs or their habitat in the Little Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Spotted frogs were unlikely to have been impacted by the 2002 fire in the Upper North Fork Malheur River Watershed because the fire occurred outside of potential habitat areas.

- **Determination:** Alternative 1 will have **no impact** on individual Columbia spotted frogs or their habitat in the Upper North Fork Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Alternative 2:

Generally, proposed activities will not occur in habitat for spotted frogs (streams, stream margins, ponds, and springs). However, adverse impacts to individual Columbia spotted frogs may occur during felling and yarding activities in RHCAs. Directional falling of trees away from stream channels and use of helicopters to yard trees will mitigate potential impacts to habitat adjacent streams. Potential impacts to habitat associated with ponds, springs, and seeps will be protected with no-cut areas. Ponds and large springs in salvage activity areas will be protected from disturbance with 100 ft no cut buffers. Smaller springs and seeps in salvage activity areas will be protected with 50 ft no cut buffers.

- **Determination:** Alternative 2 **may impact** individual Columbia spotted frogs or their habitat in the Little Malheur River Watershed and **will not contribute to a trend towards federal listing or cause a loss of viability to the population or species** (MIIH).

Habitat for Columbia spotted frogs is not present in the Upper North Fork Malheur River Watershed portion of the project area. Salvage activities are not planned for RHCAs in the Swamp Creek subwatershed under Alternative 2. Adverse effects to spotted frog habitat in

Spring Creek outside of the project area is not expected to occur due to low erosion potential on these units and the current condition of RHCAs.

- **Determination:** Alternative 2 will have **no impact** on individual Columbia spotted frogs or their habitat in the Upper North Fork Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Alternatives 3 and 4:

Potential impacts to habitat associated with riparian areas and stream channels will be protected from disturbance by foregoing salvage activities in RHCAs. Potential impacts to habitat associated with ponds, springs, and seeps will be protected with no-cut areas. Ponds and large springs in salvage activity areas will be protected from disturbance with 100 ft no cut buffers. Smaller springs and seeps in salvage activity areas will be protected with 50 ft no cut buffers.

- **Determination:** Alternatives 3 and 4 will have **no impact** on individual Columbia spotted frogs or their habitat in the Little Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Habitat for Columbia spotted frogs is not present in the Upper North Fork Malheur River Watershed portion of the project area. Salvage activities are not planned for RHCAs in the Swamp Creek subwatershed under Alternatives 3 and 4. Adverse effects to spotted frog habitat in Spring Creek outside of the project area is not expected to occur due to the low erosion potential on these units and current condition of RHCAs. Therefore, effects from activities proposed in this portion of the project area will not extend beyond the project area.

- **Determination:** Alternatives 3 and 4 will have **no impact** on individual Columbia spotted frogs or their habitat in the Upper North Fork Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Alternative 5:

Activities proposed will not occur in spotted frog habitat therefore adverse impacts to spotted frogs will not occur in the Little Malheur River Watershed.

- **Determination:** Alternative 5 will have **no impact** on individual Columbia spotted frogs or their habitat in the Little Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Activities proposed will not occur in spotted frog habitat therefore adverse impacts to spotted frogs will not occur in the Upper North Fork Malheur River Watershed.

- **Determination:** Alternative 5 will have **no impact** on individual Columbia spotted frogs or their habitat in the Upper North Fork Malheur River Watershed and will not contribute to a trend towards federal listing or cause a loss of viability to the population or species (NI).

Proposed Critical Habitat for Bull Trout

Summary of Effects and Determination

Alternative 1 (No Action):

Little Malheur River Watershed: Alternative 1 will slow the recovery of proposed critical habitat for bull trout in the Little Malheur River. Fine sediment levels in the Little Malheur River will remain elevated due chronic inputs of fine sediment from old skid trails and FSR 1672479 in the Camp Creek drainage. Prior to the 2002 fire fine sediment levels in the Little Malheur River were between 13 and 21% and would be rated as functioning at risk.

- **Determination:** Alternative 1 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Little Malheur River Watershed.

Upper North Fork Malheur River Watershed: Alternative 1 will not affect channel stability, physical habitat, or water quality elements. Therefore, affects to proposed critical habitat for bull trout in the North Fork Malheur River watershed are unlikely.

- **Determination:** Alternative 1 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Upper North Fork Malheur River Watershed.

Alternative 2:

Little Malheur River Watershed: Salvaging standing dead trees < 20" dbh from RHCAs will result in a reduction in the amount of woody debris levels in the Little Malheur River and Camp Creek. Pool habitat will be reduced by an estimated two pools in the Little Malheur River and 18 pools in Camp Creek compared to Alternative 1. This will result in a reduction of 0.7 pools per mile in the Little Malheur River and 5.6 pools per mile in Camp Creek. However, since Forest Plan standard for LWD will be met for the next 100 years in both the Little Malheur River (Figure 21, Map Section) and Camp Creek (Figure 21, Map Section) it is likely that the Forest Plan standard for pools will also be met.

Salvaging standing dead trees < 20" dbh from RHCAs will also reduce cover and habitat complexity compared to Alternative 1. Reducing the amount of woody debris would also reduce the amount of fine sediment trapped and incorporated into stream banks.

Alternative 2 will result in fine sediment levels lower than Alternative 1 once effects from the 2002 fire have subsided. The old skid trails and FSR 1672479 are chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels. Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Alternative 2 will result in reducing existing shade levels along Camp Creek and the Little Malheur River by about 1% compared to Alternative 1 due to the salvage of standing dead trees < 20" dbh. It is unlikely that the recovery of water temperatures to pre-fire levels will differ between Alternative 1 and Alternative 2.

- **Determination:** Alternative 2 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Little Malheur River Watershed.

Upper North Fork Malheur River Watershed: Activities are not proposed in RHCAs in the Upper North Fork Malheur River Watershed under Alternative 2. Therefore, Alternative 2

will not affect channel stability, physical habitat, or water quality elements and affects to proposed critical habitat for bull trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 2 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Upper North Fork Malheur River Watershed.

Alternative 3:

Little Malheur River Watershed: Alternative 3 will result in fine sediment levels lower than Alternative 1 once the effects from the 2002 fire have subsided. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels. Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Pools and habitat complexity under Alternative 3 would be similar to Alternative 1 because removal of standing dead trees < 20" dbh in RHCAs would not occur. Alternative 3 will not adversely impact channel stability, physical habitat, or water quality elements.

- **Determination:** Alternative 3 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Little Malheur River Watershed.

Upper North Fork Malheur River Watershed: Activities are not proposed in RHCAs in the Upper North Fork Malheur River Watershed under Alternative 3. Therefore, Alternative 3 will not affect channel stability, physical habitat, or water quality elements and affects to proposed critical habitat for bull trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 3 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Upper North Fork Malheur River Watershed.

Alternative 4:

Little Malheur River Watershed: Once effects from the 2002 fire have subsided, Alternative 4 will result in fine sediment levels lower than Alternative 1. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels. Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

Pools and habitat complexity under Alternative 3 would be similar to Alternative 1 because removal of standing dead trees < 20" dbh in RHCAs would not occur. Alternative 3 will not adversely impact channel stability, physical habitat, or water quality elements.

- **Determination:** Alternative 4 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Little Malheur River Watershed.

Upper North Fork Malheur River Watershed: Activities are not proposed in RHCAs in the Upper North Fork Malheur River Watershed under Alternative 4. Therefore, Alternative 4

will not affect channel stability, physical habitat, or water quality elements and affects to proposed critical habitat for bull trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 4 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Upper North Fork Malheur River Watershed.

Alternative 5:

Little Malheur River Watershed: Once the effects from the 2002 fire have subsided, Alternative 5 will result in fine sediment levels lower than Alternative 1. Old skid trails and FSR 1672479 have been chronic sources of fine sediment and have likely resulted in elevation of fine sediments levels above background levels. Long-term reductions in fine sediment in the lower portion of the Little Malheur River and Camp Creek are likely to result from obliterating old skid trails and decommissioning FSR 1672479 compared to Alternative 1. However, there is potential for increases in fine sediment for 2 to 3 years because soil disturbance on about 5 acres will occur adjacent to Category 4 stream channels in unstable soils.

- **Determination:** Alternative 5 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Little Malheur River Watershed.

Upper North Fork Malheur River Watershed: Activities are not proposed in RHCAs in the Upper North Fork Malheur River Watershed under Alternative 5. Therefore, Alternative 5 will not affect channel stability, physical habitat, or water quality elements and affects to proposed critical habitat for bull trout in the North Fork watershed are unlikely.

- **Determination:** Alternative 5 **would not result in adverse modification** (NAM) to proposed critical habitat for bull trout in the Upper North Fork Malheur River Watershed.

Consistency With Direction and Regulations

Forest Plan

Alternative 1: Alternative 1 would be consistent with: Forest-wide standards for fish, MA 3A standards, and INFISH standards and guidelines.

Alternative 2: Alternative 2 would be consistent with: Forest-wide standards for fish and MA 3A standards. Alternative 2 would also be consistent with the following INFISH standards and guidelines:

- TM-1a. Proposed salvage activities in RHCAs would be consistent because woody debris needs are expected to be met for the next 100 years in the lower reaches of the Little Malheur River and Camp Creek. Slight reductions in shading resulting from salvage activities proposed under Alternative 2 along the lower reaches of the Little Malheur River and Camp Creek in the project area will not lead to a further degradation in water temperatures. Under Alternative 2, Forest standards for pools will likely be met because sufficient quantities of LWD will be present for the next 100 years.
- RF-2b. Proposed temporary roads and helicopter landings are located outside of RHCAs.
- RF-3a & b. Roads that will be used for proposed salvage activities will have drainage problems repaired and will be brought up to standards prior to haul.

- RF-3c. Roads not need for future management activities and old skid trails that have been identified as sources of fine sediment will be closed, decommissioned, or obliterated.
- RA-2. Hazard trees felled in RHCAs will be left on site where woody debris objectives are not being met.
- Forest Plan RMOs. Activities proposed under Alternative 2 would not retard the attainment of Forest Plan RMOs for aquatic habitat (LWD, replacement LWD, pool frequency, bank stability, width to depth ratio, sediment/substrate, shading, and water temperature). Alternative 2 would result in short-term increases in fine sediment in Camp Creek and the Little Malheur River due to road decommissioning and old skid-trail obliteration activities. However, these activities will result in long-term decreases in fine sediment in Camp Creek and the Little Malheur River compared to Alternative 1.

Alternatives 3 and 4: Alternatives 3 and 4 would be consistent with: Forest-wide standards for fish and MA 3A standards. Alternatives 3 and 4 would also be consistent with the following INFISH standards and guidelines:

- TM-1a. Proposed salvage activities would not occur in RHCAs.
- RF-2b. Proposed temporary roads and helicopter landings are located outside of RHCAs.
- RF-3a & b. Roads that will be used for proposed salvage activities will have drainage problems repaired and will be brought up to standards prior to haul.
- RF-3c. Roads not needed for future management activities and old skid trails that have been identified as sources of fine sediment will be closed, decommissioned, or obliterated.
- RA-2. Hazard trees felled in RHCAs will be left on site where woody debris objectives are not being met.
- Forest Plan RMOs. Activities proposed under Alternatives 3 and 4 would not retard the attainment of Forest Plan RMOs for aquatic habitat (LWD, replacement LWD, pool frequency, bank stability, width to depth ratio, sediment/substrate, shading, and water temperature). Alternatives 3 and 4 would result in short-term increases in fine sediment in Camp Creek and the Little Malheur River due to road decommissioning and old skid-trail obliteration activities. However, these activities will result in long-term decreases in fine sediment in Camp Creek and the Little Malheur River compared to Alternative 1.

Alternative 5: Alternative 5 would be consistent with: Forest-wide standards for fish and MA 3A standards. Alternative 5 would also be consistent with the following INFISH standards and guidelines:

- RF-3a & b. Roads with drainage problems will be repaired and brought up to standards.
- RF-3c. Roads not need for future management activities and old skid trails that have been identified as sources of fine sediment will be closed, decommissioned, or obliterated.
- RA-2. Hazard trees felled in RHCAs will be left on site where woody debris objectives are not being met.
- Forest Plan RMOs. Activities proposed under Alternative 5 would not retard the attainment of Forest Plan RMOs for aquatic habitat (LWD, replacement LWD, pool

frequency, bank stability, width to depth ratio, sediment/substrate, shading, and water temperature). Alternative 5 would result in short-term increases in fine sediment in Camp Creek and the Little Malheur River due to road decommissioning and old skid-trail obliteration activities. However, these activities will result in long-term decreases in fine sediment in Camp Creek and the Little Malheur River compared to Alternative 1.

Clean Water Act Section 303(d)

Alternatives 1 (No Action), 3, 4, and 5

There are two streams currently on the 303(d) list. The Little Malheur River is currently listed for summer rearing temperature for salmonids. The N.F. Malheur River is currently listed for not meeting water quality standards for bull trout spawning and rearing in reaches above Crane Creek and summer rearing for salmonids below Crane Creek. No changes in the Section 303(d) List of Water Quality Impaired water bodies would be made as a result of alternatives 1, 3, and 4. There would be no effects on 303(d) listed streams because streamside shading will not be altered under the proposed activities for alternatives 1, 3, 4, and 5 because activities that could reduce shading along stream are not proposed. Felling roadside hazard trees along streams for safety concerns may be necessary. However, it is unlikely this activity will affect shading to the point of causing a measurable change in water temperatures. Therefore, these alternatives would not increase water temperature and would be consistent with the Clean Water Act and the Forest Plan as amended.

Alternative 2

Activities proposed under Alternative 2 include removal of standing dead trees <20" dbh in the RHCAs adjacent to the lower reaches of the Little Malheur River and Camp Creek in the project area. Felling roadside hazard trees for safety concerns may also be necessary. Currently, boles of standing dead trees provide 3% or less of the shade provided by a live forest stand. A reduction in shade of 1% to 3% would not result in a measurable increase in stream temperature. Removal of standing dead trees <20" dbh in RHCAs would not affect the rate of natural recovery of shade. Based on the above effects, this alternative would not increase temperature and would be consistent with the Clean Water Act and the Forest Plan as amended.

Endangered Species Act

All alternatives are consistent with the Endangered Species Act (see Appendix D, Aquatic Species Biological Evaluation). All alternatives will have **no effect** on bull trout or and **will not result in adverse modification** proposed critical habitat for bull trout. Based on these effect calls, consultation with the US Fish and Wildlife Service was not necessary.

The Monument ID Team followed the streamlining process to address ESA issues related to the Monument Fire Recovery Project. The Monument ID Team met with the Malheur NF Level 1 Team seven times over a two-year period to discuss the Monument Fire Recovery Project. Of those seven meetings, ESA issues concerning aquatic species were discussed during five meetings:

- **11/14/2002:** The ID Team met with the Level 1 Team for a general discussion of potential activities for the recovery project and potential ESA issues.

- **01/21/2003:** The ID Team met with the Level 1 Team to discuss the draft proposed action for the Monument Fire Recovery Project.
- **04/16/2003:** The Fisheries Biologist on the ID Team met with the Level 1 Team to discuss issues concerning aquatic species.
- **05/13/2003:** The Fisheries Biologist on the ID Team met with the Level 1 Team to discuss issues concerning bull trout and proposed designated critical habitat for bull trout.
- **06/17/2003:** The ID Team and the Level 1 Team visited the Monument Fire Recovery project area and the Monument Fire area to discuss proposed activities for the Monument Fire Recovery Project, design criteria, and potential effects to threatened and endangered species.

Based on USFWS' review of the biological evaluation and supporting information provided in Level 1 team meetings, and field trips to the fire and project areas, USFWS did not object to the Forests' no effect determinations for bull trout or proposed critical habitat for bull trout.

Recreational Fisheries

All Alternatives:

Recreational fishing opportunities have been reduced in the Monument burn area by water quality and habitat degradation resulting from the 2002 fire and prior management activities. Alternatives 2, 3, 4 and 5 include decommissioning roads and old skid trails. These aquatic conservation and restoration actions will improve quantity, function, sustainable productivity, and distribution of recreational fisheries by reducing impacts from elevated levels of fine sediment as directed under Executive Order 12962, Recreational Fisheries.

Irreversible/ Irretrievable Effects

Irreversible effects are not expected. Reduced fish population viability for redband trout could be an irretrievable commitment of resources, but the possibility is not expected. INFISH established explicit goals and objectives for inland fish habitat condition and function. By following INFISH standards and guidelines as well as design criteria specific to this project, it is believed that irretrievable commitment of this resource can be avoided. The goal is to achieve a high level of habitat diversity and complexity through a combination of habitat features.

Wildlife

Regulatory Framework

Two principle laws relevant to wildlife management are the National Forest Management Act of 1976 (NFMA) and the Endangered Species Act (ESA) of 1973. Regulations promulgated subsequent to passing NFMA have presented various procedures for species management. The Forest Service is directed to manage fish and wildlife habitat sufficiently to maintain viable populations of all native and desirable non-native wildlife species and conserve listed Threatened or Endangered species populations (36CFR219.19). Additional guidance found in Forest Service Manual Direction advises that critical habitat and other habitats essential

for conservation of endangered, threatened, and proposed species be identified and preventive measures employed. Prescriptions must be tailored to avoid adverse modifications or destruction of said habitats (FSM 2670.31 (6)). ESA requires Forests to manage for recovery of threatened and endangered species and the ecosystems upon which they depend. Forests are required to consult with the Fish and Wildlife Service if agency proposed activities may affect populations or habitats of listed species.

The Forest Service Manual also directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern. Forests are then required to monitor sensitive species populations and prevent declines that might require listing under ESA (FSM 2670.32 (4)).

The principle policy document relevant to wildlife management is the Malheur National Forest Land and Resource Management Plan of 1990 (Malheur Forest Plan). This document provides standards and guidelines for management of wildlife species and habitats on the Forest. These standards and guidelines apply to such habitat features as big game cover, road densities, primary cavity excavator habitat, snag and down log habitat, blue grouse winter roost habitat, unique and sensitive species habitat, raptor habitat, and Endangered Species Act listed species (USDA Forest Service, 1990). Regional Forester Eastside Forest Plans Amendment 2 (1995) was a non-significant Malheur Forest Plan amendment that provided additional standards for late and old successional (LOS), LOS connectivity, snags, down logs, and northern goshawks.

Analysis Method

Species included in this section are those identified by the regulatory framework described above. In addition, species have been included as identified through public comment where concerns or issues were expressed relative to potential effects to species and/or habitats from alternatives proposed. Where possible, as with the management indicator species, representative species were selected to describe effects to a wider cohort of species sharing similar habitat needs. Species lacking habitat within the project area, or species that are present but would not be affected by activities proposed, were not included in this analysis.

Effects analysis for all species and habitats is based on expected tree mortality from the fire. Some dead trees currently retain green needles, but are expected to lose them in the short term.

A variety of sources of information were used to determine presence of individuals, populations and/or habitat for the different wildlife species. These information sources include wildlife and other resource habitat surveys, Geographic Information System databases, district and forest species databases, field observations, and past professional experience in dealing with species and their habitats. Population surveys were not done for any species analyzed in this document. Rather, assessments of relative populations were made based upon availability of suitable habitat, and changes to those habitats given activities proposed. This is based upon science demonstrating connections between species populations/viability and the quantity and condition of habitat at appropriate scales of analysis (USDA Forest Service 2001).

Incomplete and Unavailable Information

Species population densities and diversity information for species reviewed in this analysis were not obtainable due to lack of survey data availability. Inferences regarding species

diversity and relative population levels were made based upon habitat quality, condition, and quantity. The ability to classify and describe habitat within wilderness areas is often limited. Specifically, the lack of site-specific survey data available from wilderness areas within the project boundary resulted in data gaps. Inferences were made based upon field walk throughs, aerial photo interpretation from post fire flights, digital ortho-quad data and review of limited GIS habitat data to determine habitat quality and condition. Habitat information outside the fire area was also limited to satellite imagery data containing inconsistencies at the site-specific stand scale. This lack of information created complications in describing habitat outside the fire area. Again, field walk-throughs, aerial photo interpretation, digital ortho-quad data and review of limited GIS habitat data were used to characterize and describe habitat features outside the fire area. Site-specific snag data was lacking in certain portions of the fire. Where available, snag survey information was utilized in this analysis. In other areas, stand data were employed to determine general levels of snag densities and distribution across different diameter classes. Walk throughs, post fire aerial photo interpretation and limited GIS data were also used to make inferences on snag density, distribution and size classification for the fire area. Likewise, down wood information was also limited. Similar inferences were made to analyze effects to down wood habitats. Where applicable, professional judgment, supported by limited available information was used to assess habitat conditions.

Species Assessed

- **Management Indicator Species (MIS):** The Forest Plan identifies numerous species as MIS. These species represent certain habitat features or values of federal lands and associated habitats. These species also function to represent a cohort of other species sharing similar habitat requirements and thus become an indicator of effects and changes to habitat and populations of that larger cohort of species. Selected primary cavity excavators, the Rocky Mountain elk, and the pine marten are analyzed in this analysis.
- **Threatened, Endangered and Sensitive Species:** Species listed under the Endangered Species Act as Threatened or Endangered and species identified on the Regional Forester's Sensitive Species List were considered in this analysis per Forest Service regulations and direction. These species are specifically addressed in the Biological Evaluation that accompanies the FEIS and the Wildlife Report. Summaries of the findings are included in this section of the FEIS.
- **Other Species of Concern:** *Northern Goshawk* - Through the amended Forest Plan, the northern goshawk was identified as a specific species of concern in eastside forests (USDA Forest Service 1990, amended 1996). Specific direction for identified nesting and fledgling habitat are provided in the amendment. *Landbirds including Neotropical Migrants* – An Executive Order (January 10, 2001) directs the Forest Service to consider the conservation of landbird species in the design, analysis and implementation of activities on federal lands administered by the USDA Forest Service. Several management frameworks are available, in addition to direction from agencies such as the USDI Fish and Wildlife Service, and were considered in this analysis. *Birds of Concern 2002* – Potential effects to bird species that are listed as “Birds of Conservation Concern” (USFWS 2002) that are suspected or known to be in the project area were analyzed.
- **Dedicated Old Growth Habitat:** Dedicated old growth habitat is another habitat feature assessed in the FEIS based upon effects to existing habitats and issues expressed internally and externally.

Analysis Tools

DecAID

An advisory tool, “DecAID”, was recently developed in Region 6 to address deadwood habitats (snags and down logs) in the Pacific Northwest. This was in large part a response to the understanding that previous methods of addressing snags and down logs relative to species needs was inadequate and may not have accurately described habitat relationships (Rose et al. 2001). DecAID serves as an information database and as described, serves as an advisory tool to help managers evaluate effects, of forest conditions and existing or proposed management activities on organisms that use snags and down wood. DecAID also can help managers decide on snag and down wood sizes and levels needed to help meet wildlife management objectives. It can help managers articulate those objectives in specific, quantitative terms that can be tested in the field (Mellen et al. 2003). A complete overview of DecAID is available at: www.notes.fs.fed.us:81/pnw/DecAID/DecAID.nsf.

DecAID’s usefulness is dependent upon the specificity and magnitude of the data upon which it draws conclusions. In this analysis, limitations in terms of scale as well as habitat and structure specific limitations related to available science should be recognized. However, DecAID still provides the most comprehensive description of deadwood habitats in the states of Oregon and Washington. DecAID also supplies a good reference for habitat conditions and the level that species needs are met in the project area. DecAID was used to describe habitat conditions for a variety of primary cavity excavator species and provided a course scale of comparison for effects of activities proposed.

It should be noted that DecAID does not model biological potential or population viability. There is no direct relationship between tolerances, snag densities and sizes in DecAID data; and snag densities and sizes measuring potential population levels, as discussed in the Forest Plan (USDA Forest Service, 1990).

Habitat Effectiveness Index

The Forest Plan identifies the habitat effectiveness index (HEI) as a tool to describe elk and other big game habitat conditions and to display changes in habitat effectiveness through implementation of habitat altering projects. HEI was utilized in this analysis.

Analysis Parameters

Temporal

Established time frames are useful in describing effects of activities proposed upon different species and habitat features. Timeframes provide a temporal framework for tracking those effects and help identify duration. Effects and description of habitat are defined by three time frames: short-, mid-, and long-term time periods. These periods are defined as follows.

| | |
|------------|-------------|
| Short-Term | 0-10 Years |
| Mid-Term | 10-30 Years |
| Long-Term | 30+ Years |

These periods represent general benchmarks for habitat conditions. It also represents general benchmarks of habitat utilization by different species within those habitats and snag habitats in severely burned areas in particular.

Spatial

Three scales of analysis will occur in discussions of the Affected Environment and the Environmental Effects in this section. These scales of analysis were selected based upon the species and types of habitats discussed and spatial scale of measurable effects from alternatives proposed. Direct, indirect, and cumulative effects are addressed at each of these scales as appropriate for the species and habitat types considered. They are described below.

Project Area

This area is defined as the primary area within the Monument Fire perimeter considered for possible management actions. Figure 4 (Map Section) provides a map showing the general location and extent of the project area. The project area consists of management areas (MA): General Forest and Range (MA-1, 2), Non-Anadromous Riparian Area (MA-3A), Big Game Winter Range (MA-4A) and Old Growth Habitat (MA-13). Figure 4 (Map Section) displays the location and general layout of the different management areas in the project area. Chapters 1 and 2 provide specific information about the location and the Management Areas included in this area designation. The Project area is about 8,600 acres in size.

Fire Area

Also described as the “burn area” or Monument Fire Area, this area is defined by the portion of the Monument Fire that burned in 2002 residing within the Prairie City Ranger District. This area includes the project area as well as the burned portion of the Monument Rock Wilderness (Management Area 6B). Figure 3 (Map Section) provides a map of the extent of the fire area and fire severity within the Prairie City Ranger District boundary. The fire area is about 20,186 acres in size.

Analysis Area

The analysis area describes the largest area considered for analysis purposes and serves as the outer limits of measurable effects for actions and activities proposed. This area includes the two subwatersheds affected by the Monument Fire including the project area. These two subwatersheds are the Swamp Creek and Upper Little Malheur River subwatersheds (Figure 2, Map Section). The two subwatersheds cover about 57,000 acres of habitat, with the Swamp Creek subwatershed covering about 25,577 acres and the Upper Little Malheur River subwatershed covering about 31,444 acres. Nearly all Management Area designations are represented in the Analysis Area. The project area covers about 7,686 acres in the Upper Little Malheur River subwatershed, and 896 acres of the Swamp Creek subwatershed.

The analysis area also includes the Wallowa-Whitman’s portion of the Monument Fire. This area is included in order to discuss the cumulative effects of activities proposed by the Whitman Unit of the Wallowa-Whitman National Forest. A salvage/restoration project is proposed in that portion of the fire. Details of this action are described in Chapter 1.

Affected Environment & Environmental Effects - Management Indicator Species

Primary Cavity Excavator Species (PCE)

Introduction

The Forest Plan (Chapter IV, Forest Wide Standards, Standard 61) identifies 11 primary cavity excavators as management indicator species (MIS) for the availability and quality of

dead and defective wood habitat: black-backed woodpecker, three-toed woodpecker, Lewis' woodpecker, white-headed woodpecker, pileated woodpecker, downy woodpecker, hairy woodpecker, northern flicker, Williamson's sapsucker, red-breasted sapsucker, and yellow-bellied sapsucker. The red-breasted and yellow-bellied sapsuckers were formerly classified with the red-naped sapsucker. Neither the red-breasted nor the yellow-bellied sapsucker is known to occur in eastern Oregon (Gilligan et al. 1994). The red-naped sapsucker does occur throughout the area and will be used as a substitute MIS in this discussion. By providing habitat for these primary cavity excavators, habitat is provided for many other dead wood dependent species as well.

Primary cavity excavators' use burned forest habitats and green forest habitats differently. Tree canopy cover, understory shrub and grass cover, and snag numbers and qualities are all different. This analysis assesses two different habitat conditions, those created by high-moderate to severe fire severities resulting in complete or near complete mortality in the forested vegetation, and those affected by light to low-moderate fire severity that resulted in relatively lower levels of mortality in the forest canopy.

Areas of high fire severity are no longer functioning as they did prior to the fire. Post-fire, they have an abundance of snags, and little green canopy or large down logs. Structurally, these stands are classified primarily as stand initiation (SI) and understory reinitiation (UR). The black-backed, three-toed, hairy and Lewis' woodpeckers, and the northern flicker are analyzed for their response to severely burned forests (Kotliar et al. 2002, Saab et al. 2002).

Areas of light fire severity generally maintained the pre-fire stand structures, although snag levels were somewhat increased and canopy closure and canopy structure complexity were somewhat reduced. The lightly burned stands will likely continue to function as they did prior to the fire. The pileated woodpecker and white-headed woodpecker are analyzed for their selection of light severity burn areas, particularly stands that still classify as late and old (LOS) structure (Csuti et al. 1997). The downy woodpecker, Williamson's sapsucker, and red-naped sapsucker are primarily analyzed for their selection of light severity burn habitats and their use of hardwood habitats (Kotliar et al. 2002, Csuti et al. 1997).

The DecAID Advisor tool will be used to assess effects of alternatives on PCE habitats. DecAID provides two sets of data with which to analyze snag habitats: 1) snag inventory data and 2) wildlife use data. The following discussions use snag inventory data from the Prairie City Ranger District portion of the Monument Fire area, and compares it to inventory and woodpecker use data described in DecAID. The DecAID analysis area is the portion of the fire area on Prairie City RD.

Comparison of Inventory Data: Table W-1 displays post-fire snag distributions in the Monument fire area as compared to inventory distributions derived from DecAID. The DecAID snag distributions were derived from un-harvested inventory plots in Oregon and Washington Eastside Forests. Snag distributions are displayed for two wildlife habitat types: ponderosa pine/Douglas-fir and mixed conifer. The top half of the table displays snag distribution for snags greater than 10 inches DBH. The bottom half of the table displays snags distribution for snags greater than 20 inches DBH. The table displays snag distribution by density groups (e.g., 0 to 4 snags per acre). Note that ponderosa pine/Douglas-fir habitat types displays density groups in increments of four (0 to 4, 4 to 8, etc) versus the mixed conifer habitat type which displays density groups in increments of six (0 to 6, 6 to 12, etc); this parallels the way inventory data is displayed in DecAID.

Table W-1. Post-fire snag densities by density group (Snags/Acre) for Ponderosa Pine/Douglas-fir and Blue Mountain Mixed Conifer wildlife habitat types.

| Density Group (Alpha/Numeric Code) | Ponderosa Pine/Douglas-Fir | | | Mixed Conifer | | |
|---|----------------------------|----------------------------------|-----------------------------------|----------------|-----------------------------------|-----------------------------------|
| | Snags/Acre | * DecAID Snag Distribution | Monument Existing Condition | Snags /Acre | ** DecAID Snag Distribution | Monument Existing Condition |
| Snags equal to or greater than 10" dbh (24cm) | | | | | | |
| 1 | 0-4 | 52% | 1% | 0-6 | 41% | 4% |
| 2 | 4-8 | 15% | 4% | 6-12 | 19% | 5% |
| 3 | 8-12 | 22% | 6% | 12-18 | 15% | 9% |
| 4 | 12-16 | 7% | 9% | 18-24 | 6% | 14% |
| 5 | 16-20 | 0% | 7% | 24-30 | 8% | 8% |
| 6 | 20-24 | 0% | 13% | 30-36 | 6% | 4% |
| 7 | 24-28 | 0% | 10% | 36-42 | 3% | 1% |
| 8 | 28-32 | 0% | 3% | 42-28 | 0% | 4% |
| 9 | 32-36 | 2% | 2% | 48-54 | 0% | 6% |
| 10 | > 36 | 0% | 45% | >54 | 0% | 45% |
| | | 99.5% | 100% | | 100% | 100% |
| | | | | | | |
| Snags equal to or greater than 20" dbh (50 cm) | | | | | | |
| A | 0-2 | 47% | 20% | 0-2 | 12% | 18% |
| B | 2-4 | 39% | 24% | 2-4 | 28% | 19% |
| C | 4-6 | 8% | 24% | 4-6 | 21% | 28% |
| D | 6-8 | 0% | 8% | 6-8 | 15% | 10% |
| E | 8-10 | 3% | 10% | 8-10 | 10% | 14% |
| F | 10-12 | 0% | 6% | 10-12 | 7% | 2% |
| G | 12-14 | 0% | 0% | 12-14 | 1% | 4% |
| H | 14-16 | 0% | 3% | 14-16 | 1% | 2% |
| I | 16 –18 | 0% | 5% | 16 –18 | 0% | 1% |
| J | >18 | 0% | 0% | >18 | 3% | 2% |
| | | 100% | 100% | | 100% | 100% |
| DecAID Inventory Data: | | | | | | |
| * Wildlife Habitat Type = Ponderosa Pine/Douglas-fir; Structural Condition = Larger Trees; | | | | | | |
| ** Wildlife Habitat Type = Blue Mountain Mixed Conifer; Structural Condition = Larger Trees | | | | | | |

The fire created an abundance of new snags. Snag density, size and distribution are a result of several factors: fire severity, past harvest, stand age, tree species composition, fire suppression, and the effects of past disturbances such as wind, fire, pathogens, and insects.

Habitats in the project area are generally dry ponderosa pine or Douglas fir sites. Stand densities are generally lower than in moister, mixed conifer sites due to lower site productivities, southerly aspect slope conditions, and dryer habitat conditions. Even in severe burn conditions, these vegetation types would not be expected to produce high snag densities under historic stand conditions and fire regimes (Table W-1). Table W-1 indicates that 45% of the ponderosa pine/Douglas fir types currently support snag densities in the highest snag density group (Group #10).

Outside the project area, in the Monument Rock Wilderness, snag densities are generally higher in severe burn severity areas because these areas are generally cooler, moister mixed conifer types that support much higher tree densities. Table W-1 indicates that 56% of the mixed conifer types currently have snag densities greater than 36 snags per acre (Groups 7 through 10), compared to 45% of the ponderosa pine/Douglas fir types (Group 10). Recall that snag density group increments are different for the mixed conifer (increments of 6 snags/acre) versus the ponderosa pine/Douglas-fir habitat types (increments of 4 snags/acre).

Little of the fire area has received intensive timber harvest. What harvest has occurred primarily took place in the 1960's, and was generally selective tree removals that harvested only a portion of the large diameter trees and few of the smaller diameter trees. These sales were primarily in the Camp Creek drainage. Fire suppression activities, and livestock grazing, have generally resulted in higher tree densities than occurred historically. These management activities did have some effects on live tree densities before the fire, and therefore, have contributed to snag densities post-fire.

It is useful to compare existing snag distributions in the Monument Fire area to those in the DecAID inventory data. Table W-1 indicates that total snag levels (snags 10" DBH and greater) in the fire area are different than snag levels displayed in DecAID. This disparity is particularly obvious when comparing density groups 1 through 4 and density groups 7 through 10. This comparison suggests that the Monument Fire area may currently support snags at a much higher level than would be expected under historic fire regimes. When analyzing the larger snags (snags 20" dbh and greater), the disparity in snag densities between Monument and DecAID is still observed, but noticeably reduced. Therefore, the fire area may be providing for PCE species at a much higher level than would be typically expected.

Comparison of Wildlife Use data: DecAID presents information on wildlife use based on snag density and snag diameter. This information is presented at three statistical levels: low (30% tolerance level), moderate (50% tolerance level), and high (80% tolerance level). A tolerance level can also be defined as an "assurance of use" or the likelihood that individuals in a population of a selected species will use an area given a specified snag size and density. For instance, at the 30 percent tolerance level for any given species, it would be expected that only 30 percent of a population would find suitable or usable habitat at a specified snag density. Consequently, 70 percent of a population would *not* find suitable habitat conditions in habitats at that snag density.

Snag density, size, and distribution influence use levels and vary by individual species. For example, post-fire data in DecAID suggests that Lewis' woodpecker would need 10

snags/acre to meet the 30% tolerance level, whereas black-backed woodpeckers would need 62 snags/acre.

Table W-2 displays the percentage of total suitable habitat in the Monument Fire area by cavity nesting species and tolerance level. Values are displayed for the five species that the Forest Plan identifies as management indicator species (MIS). For the remaining MIS in the Forest Plan, DecAID does not provide wildlife use information for post-fire habitats; effects discussions will be more qualitative than quantitative.

Table W-2. Existing tolerance level for cavity nesting species within the fire area

| Species | Percentage of total suitable habitat in Monument Fire area by Tolerance Level* | | | |
|-------------------------|--|---------------------|---------------------|---------------------|
| | <30% Tolerance Level | 30% Tolerance Level | 50% Tolerance Level | 80% Tolerance Level |
| Black-backed Woodpecker | 78% | 18% | 4% | 0% |
| Hairy Woodpecker | 11% | 42% | 41% | 6% |
| Lewis' Woodpecker | 7% | 69% | 21% | 3% |
| Northern Flicker | 19% | 80% | 1% | 0% |
| White-headed Woodpecker | 24% | 38% | 36% | 2% |

Severe Fire-Affected Habitats

The black-backed, three-toed, hairy and Lewis's woodpecker, and the northern flicker are highly associated with severe fire-affected habitats and will be discussed in this section. The red-naped sapsucker, Williamson sapsucker and downy woodpecker will be discussed relative to changes in riparian habitat. The acres displayed in this section for severe fire affected habitats are summarized in Chapter 2, Table 2.8.

Affected Environment

About 16,942 acres of habitat within the Prairie City Ranger District portion of the Monument Fire burned at a high-moderate to severe fire severity. The majority of the high-moderate to severely burned area has mortality levels exceeding 80% based upon post-fire surveys. Mortality levels likely will rise because of secondary fire effects. Most of severe fire-affected habitat type is at or near 100% mortality, as about 11,870 acres (70%) of the total 16,942 acres burned at the severe fire severity level. These high snag density groups are displayed in Table W-1, most notably in density groups 6-10. Structurally, these stands are primarily classified as understory reinitiation (UR) or stand initiation (SI), see figure 3, Fire Severity and figure 16 of Map Section, Forest Structure.

Research (Hutto 1995, Sallabanks 1995, Saab and Dudley 1997, Saab et al. 2002) indicates that several PCE species will benefit from severely burned habitat created by the Monument Fire. The black-backed, three-toed, hairy and Lewis's woodpeckers, and the northern flicker are highly associated with these habitats. The species expected to respond to light to

moderate-low fire severity habitats include the pileated and the white-headed woodpeckers. These species generally have habitat requirements that are not available in severely burned habitats. While use of severely burned areas can occur, this often occurs in close proximity to unburned or lightly burned habitats that retain green-forested canopy cover. Pileated woodpecker and white-headed woodpecker will be discussed in the light fire-affected habitats section.

Generally, post-fire habitat conditions are considered ideal for PCE species, but Table W-2 suggests that even under the present conditions, snag densities in Monument will provide very little habitat for species at the 80% tolerance level. As stated previously, much of this condition can be attributed to lower site productivities, southerly aspect slope conditions, and drier habitat conditions in the Monument Fire area.

The Lewis woodpecker and hairy woodpecker have the highest levels of habitat available to them because of the 2002 fire (see Table W-2). Suitable habitat for the northern flicker is somewhat lower. The black-backed and three-toed woodpeckers tend to use areas with much higher snag densities than the other three species; therefore, these species have benefited from the fire, but at relatively low levels compared to the other PCE species. For the black-backed woodpecker, 22% of the Monument Fire area provides for this species at the 30% tolerance level or better.

Even though DecAID suggests that snag densities in Monument will only provide 22% of the area for black-backed woodpecker at the 30% tolerance level or better, populations are expected to respond favorably compared to pre-fire conditions, which provided poor habitat. The black-backed, three-toed and hairy woodpeckers begin to use burned habitat shortly after the fire; they are strong excavators and can drill into the newly created, hard snags.

Approximately 1,400 RHCA acres burned at a moderate to severe fire severity level. These moister riparian sites tend to support a higher density of trees and because of the fire now support a higher level of snags. Hardwood species in the major riparian areas such as Camp Creek and the Little Malheur River were also killed in the fire. The combined loss of conifers and hardwoods reduced habitat for the red-naped sapsucker, Williamson's sapsucker, and downy woodpecker.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, indirect, or cumulative effects were addressed.

Direct and Indirect Effects

Tables W-3 through W-9 will be used to discuss effects of the alternatives on snag densities and PCE tolerance levels.

Tables W-3 and W-4 display snag distribution by alternative, as compared to the inventory distribution derived from DecAID. The DecAID snag distributions were derived from unharvested inventory plots in Oregon and Washington Eastside Forests. This distribution is assumed to best reflect expected snag levels. The majority of stand treatments are proposed in the ponderosa pine/Douglas-fir habitat types; snag densities vary dramatically between alternatives (see Table W-3). Because so little harvest is proposed in the mixed conifer habitat types, snag densities in this habitat type vary little between alternatives (see Table W-4). Therefore, the remainder of effects discussions for woodpecker species will focus on the ponderosa pine/Douglas-fir habitat types.

Table W-3. Wildlife habitat type = Ponderosa Pine/Douglas-fir; Structural condition = larger trees

| Density Group (Alpha/Numeric Code) | Snags/Acre | DecAID Snag Distribution* | Alternatives 1 and 5 | Alternative 2 | Alternative 3 | Alternative 4 |
|--|------------|------------------------------|-------------------------|---------------|---------------|---------------|
| Snags equal to or greater than 10" dbh (24cm) | | | | | | |
| 1 | 0-4 | 52% | 1% | 41% | 1% | 32% |
| 2 | 4-8 | 15% | 4% | 3% | 4% | 3% |
| 3 | 8-12 | 22% | 6% | 4% | 5% | 4% |
| 4 | 12-16 | 7% | 9% | 5% | 33% | 6% |
| 5 | 16-20 | 0% | 7% | 4% | 6% | 5% |
| 6 | 20-24 | 0% | 13% | 11% | 12% | 11% |
| 7 | 24-28 | 0% | 10% | 7% | 8% | 8% |
| 8 | 28-32 | 0% | 3% | 2% | 2% | 2% |
| 9 | 32-36 | 2% | 2% | 1% | 1% | 1% |
| 10 | > 36 | 0% | 45% | 22% | 28% | 28% |
| | | 99.5% | 100% | 100% | 100% | 100% |
| Snags equal to or greater than 20" dbh (50 cm) | | | | | | |
| A | 0-2 | 47% | 20% | 16% | 18% | 49% |
| B | 2-4 | 39% | 24% | 54% | 42% | 15% |
| C | 4-6 | 8% | 24% | 10% | 13% | 12% |
| D | 6-8 | 0% | 8% | 4% | 7% | 5% |
| E | 8-10 | 3% | 10% | 4% | 7% | 7% |
| F | 10-12 | 0% | 6% | 5% | 5% | 5% |
| G | 12-14 | 0% | 0% | 0% | 1% | 0% |
| H | 14-16 | 0% | 3% | 2% | 2% | 2% |
| I | 16 –18 | 0% | 5% | 5% | 5% | 5% |
| J | >18 | 0% | 0% | 0% | 0% | 0% |
| | | 100% | 100% | 100% | 100% | 100% |

Table W-4. Wildlife habitat type = Blue Mountain mixed conifer; structural condition = larger trees

| Density Group (Alpha/Numeric Code) | Snags/Acre | DecAID Snag Distribution* | Alternatives 1 and 5 | Alternative 2 | Alternative 3 | Alternative 4 |
|--|------------|------------------------------|-------------------------|---------------|---------------|---------------|
| Snags equal to or greater than 10" dbh (24cm) | | | | | | |
| 1 | 0-4 | 3% | 4% | 8% | 4% | 7% |
| 2 | 4-8 | 6% | 5% | 5% | 5% | 5% |
| 3 | 8-12 | 7% | 9% | 8% | 11% | 8% |
| 4 | 12-16 | 5% | 14% | 13% | 13% | 13% |
| 5 | 16-20 | 11% | 8% | 7% | 8% | 7% |
| 6 | 20-24 | 7% | 4% | 4% | 4% | 4% |
| 7 | 24-28 | 10% | 1% | 2% | 2% | 2% |
| 8 | 28-32 | 7% | 4% | 3% | 4% | 4% |
| 9 | 32-36 | 10% | 6% | 6% | 4% | 6% |
| 10 | > 36 | 34% | 45% | 44% | 44% | 44% |
| | | 100% | 100% | 100% | 100% | 100% |
| | | | | | | |
| Snags equal to or greater than 20" dbh (50 cm) | | | | | | |
| A | 0-2 | 22% | 18% | 18% | 18% | 21% |
| B | 2-4 | 18% | 20% | 22% | 22% | 19% |
| C | 4-6 | 28% | 28% | 27% | 27% | 27% |
| D | 6-8 | 16% | 10% | 9% | 9% | 9% |
| E | 8-10 | 7% | 14% | 14% | 14% | 14% |
| F | 10-12 | 5% | 2% | 2% | 2% | 2% |
| G | 12-14 | 0% | 4% | 4% | 4% | 4% |
| H | 14-16 | 1% | 2% | 2% | 2% | 2% |
| I | 16 –18 | 0% | 0% | 0% | 0% | 0% |
| J | >18 | 3% | 2% | 2% | 2% | 2% |
| | | 100% | 100% | 100% | 100% | 100% |

Tables W-5 through W-9 display tolerance levels for each PCE species as a percentage of the Monument Fire area. Calculations exclude acres unsuitable for forestlands, i.e., acres that would never support trees or snags (about 400 acres or 2% of the fire area). Reductions in tolerance levels due to salvage harvest is buffered to an extent by the large area of snags in the Monument Rock Wilderness Area that will go untreated; the wilderness comprises 58% of the area that burned on the Prairie City Ranger District.

Table W-5. Black-Backed Woodpecker. – Wildlife tolerance levels

| Alternative | Wildlife Tolerance Levels (% fire area) | | | |
|-------------|---|--------|--------|-------|
| | 0-29% | 30-49% | 50-79% | 80% + |
| 1 and 5 | 78% | 18% | 4% | 0% |
| 2 | 80% | 16% | 4% | 0% |
| 3 | 80% | 16% | 4% | 0% |
| 4 | 80% | 16% | 4% | 0% |

Table W-6. Hairy Woodpecker – Wildlife tolerance levels

| Alternative | Wildlife Tolerance Levels (% fire area) | | | |
|-------------|---|--------|--------|-------|
| | 0-29% | 30-49% | 50-79% | 80% + |
| 1 and 5 | 11% | 42% | 41% | 6% |
| 2 | 31% | 32% | 32% | 5% |
| 3 | 11% | 50% | 34% | 5% |
| 4 | 26% | 35% | 34% | 5% |

Table W-7. Lewis' Woodpecker – Wildlife tolerance levels

| Alternative | Wildlife Tolerance Levels (% fire area) | | | |
|-------------|---|--------|--------|-------|
| | 0-29% | 30-49% | 50-79% | 80% + |
| 1 and 5 | 7% | 69% | 21% | 3% |
| 2 | 27% | 53% | 17% | 3% |
| 3 | 7% | 72% | 19% | 2% |
| 4 | 23% | 56% | 19% | 2% |

Table W-8. Northern Flicker – Wildlife tolerance levels

| Alternative | Wildlife Tolerance Levels (% fire area) | | | |
|-------------|---|--------|--------|-------|
| | 0-29% | 30-49% | 50-79% | 80% + |
| 1 and 5 | 19% | 80% | 1% | 0% |
| 2 | 39% | 60% | 1% | 0% |
| 3 | 19% | 80% | 1% | 0% |
| 4 | 39% | 60% | 1% | 0% |

Table W-9. White-Headed Woodpecker – Wildlife tolerance levels

| Alternative | Wildlife Tolerance Levels (% fire area) | | | |
|-------------|---|--------|--------|-------|
| | 0-29% | 30-49% | 50-79% | 80% + |
| 1 and 5 | 24% | 38% | 36% | 2% |
| 2 | 40% | 28% | 30% | 2% |
| 3 | 36% | 31% | 31% | 2% |
| 4 | 36% | 30% | 32% | 2% |

Alternative 1

There would be no direct or indirect effects to species such as the black-backed, three-toed, and hairy woodpeckers with selection of Alternative 1. The current condition of habitat for these species would be as described in the affected environment section and as summarized in tables W-3 through W-9. Over the short- to mid-term period, habitat for all three species would be present.

Black-backed, three-toed and hairy woodpeckers have been shown to be significantly more abundant in burned habitat, compared to unburned sites, up to four years following a fire (Kreisel and Stein 1998). Nesting increases, possibly due to a lack of habitat for red squirrels and other mammal predators. Bird abundance appears to be due to differences in foraging opportunities (Caton 1998). Over time, suitable habitat would decline for these species as number of snags and dead wood insects such as bark and cambium beetles decline. Bird populations would decrease as food sources decrease (Kreisel and Stein 1998).

Alternative 1 would have no direct or indirect effects on Lewis' woodpecker or northern flicker. Over the short- to mid-term period, these species would benefit from this alternative, as a maximum number of large snags would be available for nesting habitat. Maximum use may be delayed for several years until fire-killed trees begin to fall, stands become more open, snags are well decayed and shrub densities have increased. Foraging habits of Lewis' woodpecker, which are less reliant upon insects associated with dead wood, allow this species to persist much longer in the burned habitats. Flying insects, favored by Lewis' woodpecker, are abundant in the more open post-fire habitats. Suitable habitat conditions would likely continue into the mid-term until most of the snags have fallen (approximately 30 years).

A total of 1,400 acres of riparian habitat were severely burned and would not likely support Williamson's or red-naped sapsuckers, or downy woodpeckers as described in the Affected Environment section. Therefore, no effects to these species are anticipated.

Tables W-3 and W-4 display existing snag distribution. Values indicate total snag levels (snags 10" DBH and greater) in the fire area are much higher than snag levels displayed in DecAID. This comparison suggests that the Monument Fire area may currently support snags at a much higher level than would be expected under historic fire regimes. Therefore, PCE species are benefiting from the abundance of snags.

In an unburned forest, enough snags are left to provide for 100% percent potential populations, and enough live trees, of various sizes, are left to become snags in the future,

ensuring that snag habitat is provided over time. In areas where fire burned severely and killed all or nearly all of the trees, there are few live, green trees left to become snags in the future. Once the snags created by the Monument Fire fall, few snags will be available again until a new forest develops, trees reach sizes useful for woodpeckers, and these trees begin to die. With planting, Knotts (1998) estimated it would take 70 to 110 years to grow trees with average tree diameters approaching 15" dbh, and 120 to over 160 years for stands averaging trees 21" dbh or greater. Moderately to severely burned areas not near a seed source, or left unplanted, would remain un-forested for decades more. Since planting would not occur in Alternative 1, this would result in a snag gap in available habitat for PCE species from year 30, the time most snags are expected to be on the ground, to year 90 or more. If larger, existing snags persist longer than expected – past the 30-year mark - then the snag gap would be reduced, particularly for Alternatives 1 and 5, which retain the most large diameter snags.

Alternative 2

The direct and indirect effects of Alternative 2 is the habitat loss (snag removal) with the harvest of 3,477 acres out of a total of 16,942 acres of suitable forested habitat for the black-backed, three-toed, hairy, and Lewis' woodpeckers; and the northern flicker. This is about 20% reduction of the total suitable habitat present within the Malheur National Forest portion of the Monument Fire.

In salvage units, Alternative 2 would leave at least 2.4 large snags (>21" dbh) per acre, distributed in clumps over a 40-acre basis. Snags < 12" dbh in the helicopter units, and < 9" dbh in the tractor logged units would not be harvested. In salvage units, these densities and sizes of snags would not meet the 30 percent habitat tolerance for black-backed, three-toed, hairy, and Lewis' woodpecker; and the northern flicker and would result in the reduction of suitable habitat for these species in the short to mid-term as displayed in tables W-3 through W-9. Note the shift from higher tolerance levels to lower tolerance levels.

Alternative 2 would have the greatest effect upon the hairy and Lewis' woodpeckers, and the northern flicker, compared to alternative 3 and 4 (see tables W-6 through W-8). The effects of habitat loss for the Lewis' woodpecker would extend from the short term through the mid term periods because of their ability to use fire affected habitat over a longer period of time.

Under the existing condition, 89 percent of the fire area meets or exceeds a 30 percent tolerance level for hairy woodpecker. After implementation, 69 percent will meet or exceed the 30 percent tolerance level (see table W-6).

Under the existing condition, 93 percent of the fire area meets or exceeds a 30 percent tolerance level for Lewis' woodpecker. After implementation, 73 percent will meet or exceed the 30 percent tolerance level (see table W-7).

Under the existing condition, 81 percent of the fire area meets or exceeds a 30 percent tolerance level for northern flicker. After implementation, 61 percent will meet or exceed the 30 percent tolerance level (see W-8).

The effects on the black-backed woodpecker would be less dramatic than effects to the other species. Currently, 22% of the fire area meets snag densities that would provide for these species at the 30% tolerance level or better (see Table W-5). After implementation of Alternative 2, 20% of the fire area would provide for these species at these levels. At the 30% tolerance level, habitat would be reduced 2% within the fire area. Few areas have the high snag densities (62 snags 10" dbh and greater) preferred by these species, so less habitat is affected.

Alternative 2 proposes salvage activities in riparian habitats to reduce fuel levels in RHCAs adjacent to the lower reaches of Camp Creek and the Little Malheur River. A total of about 589 acres of moderate and severely burned riparian habitat would be affected. This amount of habitat amounts to around 29 percent of the total riparian acres burned at moderate to high severity in the fire area (see table A-20). Severely burned areas would not likely support Williamson's or red-naped sapsuckers, or downy woodpeckers as described in the Affected Environment section. Salvage harvest in RHCAs would be removed by helicopter, so where live vegetation did survive the fire, little damage is expected. Effects would be minimal.

Tables W-3 and W-4 display post-treatment snag distribution. In the ponderosa pine/Douglas-fir habitat types, snag densities are aggressively shifted towards the lower snag density classes. Changes to the mixed conifer habitat types are minimal because most of the mixed conifer habitat type is in the wilderness and are not proposed for treatment.

Alternative 2 comes closest to mimicking the inventory distributions described by DecAID for the ponderosa pine/Douglas-fir habitat type. Even though we are reducing habitat for PCE species, remaining snag habitat still meets or exceeds snag levels expected under a more typical fire regime. The large bank of snags in the Monument Rock Wilderness helps reduce these effects; 79 percent of severely burned habitats across the fire area would go untreated. At the landscape scale, snag habitats would continue to provide for PCE species, even after implementation of this alternative.

With planting, Knotts (1998) estimated it would take 70 to 110 years to grow trees with average tree diameters approaching 15" dbh, and 120 to over 160 years for stands averaging trees 21" dbh or greater. This would result in a snag gap in available habitat for PCE species from year 30, the time most snags are expected to be on the ground, to year 70. Because of planting, the snag gap would be reduced as compared to Alternative 1.

Alternative 3

The direct and indirect effects of Alternative 3 relate to the habitat loss with the harvest of 1,760 acres out of a total of 16,947 acres of suitable forested habitat for the black-backed, three-toed, hairy, and Lewis' woodpeckers; and the northern flicker. This is about 10% reduction of the total suitable habitat present within the Malheur NF portion of the Monument Fire. Values in tables W-5 through W-8 would change minimally when compared to Alternative 1 (No Action Alternative) and Alternative 5.

This alternative calls for the retention of 13 snags per acre in each harvest unit, distributed by size class as described in Chapter 2. The majority of these snags would be distributed in patches of two to six acres in size.

Alternative 3 would result in little difference to the black-backed and three-toed woodpeckers compared to Alternatives 2 and 4 on the acres of habitat harvested (see table W-5).

Currently, 22% of the fire area meets snag densities that would provide for these species at the 30% tolerance level or better (see Table W-5). After implementation of Alternative 3, 20% of the fire area would provide for these species at these levels. Even though more snags are left in salvage units in Alternative 3, these levels still don't meet the 62 snags per acre needed to meet the 30% tolerance level. As in Alternatives 2 and 4, the relatively low level of effect is indicative of the lack of suitable habitat for the species.

Of Alternatives 2, 3, and 4, species like the Lewis' and hairy woodpeckers and the northern flicker would be least affected by the implementation of Alternative 3. Habitat quality would be reduced within harvest units, but would be maintained at or above snag densities

correspondent with the 30% tolerance level. Snag prescriptions were specifically designed to provide snag densities and sizes to provide for these species at the 30% tolerance level (DecAID 2003). Although retention of 13 snags per acre is about half of the number of snags (25 to 37 snags per acre) that previous research has found as a strong selective factor for these species (Saab et al. 2002), this snag level would still provide for these species better than Alternatives 2 or 4.

Under the existing condition, 89 percent of the fire area meets or exceeds a 30 percent tolerance level for hairy woodpecker. After implementation, 89 percent will still meet or exceed the 30 percent tolerance level, although habitat will be shifted from the 50% and 80% tolerance levels to the 30% tolerance level (see table W-6).

Under the existing condition, 93 percent of the fire area meets or exceeds a 30 percent tolerance level for Lewis' woodpecker. After implementation, 93 percent will meet or exceed the 30 percent tolerance level, although habitat will be shifted from the 50% and 80% tolerance levels to the 30% tolerance level (see table W-7).

Under the existing condition, 81 percent of the fire area meets or exceeds a 30 percent tolerance level for northern flicker. After implementation, 81 percent will continue to meet or exceed the 30 percent tolerance level (see W-8). Snag requirements for northern flicker are relatively low; by retaining 13 snags per acre, all salvage acres would still provide habitat at the 30% tolerance level or better.

Severely burned areas would not likely support Williamson's or red-naped sapsuckers, or downy woodpeckers as described in the Affected Environment section. No harvest in RHCAs would occur under Alternative 3. Environmental effects for these species would be minimal.

Tables W-3 and W-4 display the post-treatment snag distribution. In the ponderosa pine/Douglas-fir habitat types, snag densities are shifted towards the medium-size snag density class 4 (12" to 16" dbh). Size class 4 changes from 4% (existing condition shown by Alternatives 1 and 5) to 31% of the fire area under Alternative 3 (Table W-3). This reflects the snag strategy of leaving 13 snags per acre in the harvest units. Alternative 3 leaves slightly more snags in the high densities (group 6 and above) than Alternatives 2 and 4, to the benefit of PCE species. Changes to the mixed conifer habitat types are minimal because most of the mixed conifer habitat type is in the wilderness.

Even though we are reducing habitat for PCE species, remaining snag habitat still meets or exceeds snag levels expected under a more typical fire regime. The large bank of snags in the Monument Rock Wilderness helps reduce these effects; 85 percent of severely burned habitats across the fire area would go untreated. At the landscape scale, snag habitats would continue to provide for PCE species, even after implementation of this alternative.

With planting, Knotts (1998) estimated it would take 70 to 110 years to grow trees with average tree diameters approaching 15" dbh, and 120 to over 160 years for stands averaging trees 21" dbh or greater. This would result in a snag gap in available habitat for PCE species from year 30, the time most snags are expected to be on the ground, to year 70. Because of planting, the snag gap would be reduced as compared to Alternative 1.

Alternative 4

The direct and indirect effects of Alternative 4 are the disturbance of salvage harvest activities and habitat loss with the harvest of 2,742 acres out of a total of 16,947 acres of

suitable forested habitat for the black-backed, three-toed, hairy, and Lewis' woodpeckers; and the northern flicker. This is about 16% reduction of the total suitable habitat present within the Malheur NF portion of the Monument Fire.

One purpose of this alternative is to maintain better distribution of undisturbed moderate and severely burned snag habitat for primary cavity excavators and other species associated with snag habitat. Eleven un-harvested blocks (about 338 acres) ranging from 4 acres to 90 acres of upland moderate and severe burned trees would be left for snag habitat. These leave blocks would provide additional foraging for species such as the black-backed and three-toed woodpeckers, which require higher snag densities. Patches of snags were left in order to better meet the needs of primary cavity excavator species because cavity nesters as a group prefer patches as opposed to single snags retained in uniform, evenly spaced distribution (Rose et al. 2001, Saab et al. 2002, Kotliar 2002). The upland leave patches and riparian areas will help distribute foraging habitat and may reduce competition within a species (Rose et al. 2001).

A non-significant Forest Plan amendment would be required because snags would not be left in salvage harvest units on a 40-acre basis. Bird abundance and nest densities would be lower in the logged stands and fewer sites in logged stands would be suitable for nesting (Caton 1998).

Implementation of Alternative 4 would have a similar affect upon the woodpeckers as found in Alternative 2. The primary difference would be a slightly smaller percentage of habitat affected due to unharvested blocks described in the previous paragraph (see tables W-5 through W-8).

Under the existing condition, 89 percent of the fire area meets or exceeds a 30 percent tolerance level for hairy woodpecker. After implementation, 74 percent will meet or exceed the 30 percent tolerance level (see table W-6).

Under the existing condition, 93 percent of the fire area meets or exceeds a 30 percent tolerance level for Lewis' woodpecker. After implementation, 77 percent will meet or exceed the 30 percent tolerance level (see table W-7).

Under the existing condition, 81 percent of the fire area meets or exceeds a 30 percent tolerance level for northern flicker. After implementation, 61 percent will meet or exceed the 30 percent tolerance level (see W-8).

Effects of this alternative on the black-backed and three-toed woodpecker are less dramatic, with effects similar to those described in Alternative 2 and 3. Currently, 22% of the fire area meets snag densities that would provide for these species at the 30% tolerance level or better (see Table W-5). After implementation of Alternative 4, 20% of the fire area would provide for these species at these levels. As in Alternatives 2 and 3, the relatively low level of effect is indicative of the lack of suitable habitat for the species. Unharvested blocks would help provide additional habitat for these species. However, the DecAID model was not sensitive enough to reflect the benefit of leaving 338 acres of snag patches.

Severely burned areas would not likely support Williamson's or red-naped sapsuckers, or downy woodpeckers as described in the Affected Environment section. No harvest in RHCAs would occur under Alternative 3. Environmental effects for these species would be minimal.

Tables W-3 and W-4 display the post-treatment snag distribution. In the ponderosa pine/Douglas-fir habitat types, snag densities are aggressively shifted towards the lower snag density classes, although not as aggressively as Alternative 2. Changes to the mixed conifer habitat types are minimal because most of the mixed conifer habitat type is in the wilderness. In the ponderosa pine/Douglas-fir habitat type, snags levels fall between levels projected under Alternatives 2 and 3. Even though we are reducing habitat for PCE species, remaining snag habitat still meets or exceeds snag levels expected under a more typical fire regime. The large bank of snags in the Monument Rock Wilderness helps reduce these effects; 85 percent of severely burned habitats across the fire area would go untreated. At the landscape scale, snag habitats would continue to provide for PCE species, even after implementation of this alternative.

With planting, Knotts (1998) estimated it would take 70 to 110 years to grow trees with average tree diameters approaching 15" dbh, and 120 to over 160 years for stands averaging trees 21" dbh or greater. This would result in a snag gap in available habitat for PCE species from year 30, the time most snags are expected to be on the ground, to year 70. Because of planting, the snag gap would be reduced as compared to Alternative 1.

Alternative 5

Alternative 5 does not salvage any trees. Implementation of this alternative would result in similar effects as those shown in Alternative 1, except for effects from planting proposed by this alternative. See Alternative 1 for a discussion of expected woodpecker use levels and a comparison of snag distributions in the Monument Fire area relative to snag distributions displayed in DecAID.

With planting, Knotts (1998) estimated it would take 70 to 110 years to grow trees with average tree diameters approaching 15" dbh, and 120 to over 160 years for stands averaging trees 21" dbh or greater. This would result in a snag gap in available habitat for PCE species from year 30, the time most snags are expected to be on the ground, to year 70. Because of planting, the snag gap would be reduced as compared to Alternative 1.

Light Severity Fire-Affected Habitats

The pileated and white-headed woodpecker are highly associated with these habitats and will be discussed in this section. The red-naped sapsucker, Williamson sapsucker and downy woodpecker will be discussed relative to changes in riparian habitat. The acres displayed in this section for light severity affected habitats are summarized in Chapter 2, Table 2.8.

Affected Environment

About 2,847 acres of forested habitat within the Prairie City Ranger District portion of the Monument Fire burned at a light to moderate-low fire severity. These habitats changed little in the diversity of forested vegetation and the structure of the forested canopy. The most significant changes are seen in the reduction in canopy closures and reductions in the lower vegetation strata. Stands are more open, particularly in the lower stratum levels of the canopy. These habitats, however, generally continue to function as they did prior to the fires, for the species that utilize those habitats.

The species expected to respond to light to moderate-low fire severity habitats include the pileated and the white-headed woodpeckers. These species generally have habitat

requirements that are not available in severely burned habitats. While use of severely burned areas can occur, this often occurs in close proximity to unburned or lightly burned habitats that retain green-forested canopy cover.

Habitat requirements for pileated and the white-headed woodpeckers differ. The pileated woodpecker is dependent upon dense, multistoried mixed conifer habitats with an abundance of large live trees and large snags. Snag densities in high quality habitat are high, often exceeding 4 large snags per acre (Bull and Holthausen 1992). Soft snags and an abundance of large down logs provide the primary forage source, i.e., carpenter ants (Bull and Holthausen 1992). Earlier research indicates that blocks of suitable habitat should be at least 300 acres (Thomas 1979), while later research indicates blocks of suitable habitat should exceed 800 acres (Bull and Holthausen 1992).

Prior to the fire, the old growth area south of the Little Malheur River provided habitat for pileated woodpeckers. Pileated woodpecker surveys are limited to one area, the old growth unit just south of the Little Malheur River. The survey was conducted in 1992 and a pileated woodpecker was seen flying away from one of the calling stations in the unit. The Monument Fire eliminated cover that provided habitat in that old growth unit.

In the two subwatersheds about 14,400 acres of mature and old-growth forest (YFMS and OFMS) remain, primarily outside the fire area. In the fire area, about 852 acres of mature and old growth forest still remains that would provide habitat for pileated woodpeckers and other interior forest cavity nesting species. In these stands, the fire did not significantly alter stand structure conditions, although canopy closures may have been reduced by as much as 5% to 20%. Snags created by the fire were mostly in the smaller diameter ranges. The one limiting factor restricting the ability of these stands to function as habitat, is their fragmented condition based upon past harvest activities and the mosaic burn patterns of the Monument Fire. Only one 250-acre block of habitat near Hunter Creek in the Camp Creek drainage remains intact; the remainder of the suitable habitat is fragmented into smaller patches, often less than 100 acres. In limited examples, some of these habitats are connected to similar suitable habitat outside the fire area.

The quality of habitat for the pileated woodpecker has declined incrementally in the earlier successional habitats. Many of the more heavily decayed snags and down logs were consumed, even in these lower intensity fires. These snags provided primary foraging habitat. Also, with mortality in portions of the canopy, the decline in canopy closure has made these habitats less suitable for the pileated woodpecker. Conversely, the mortality in these stands created new snags in almost all size classes, offering alternative foraging opportunities as well as future soft snags. While overall habitat suitability has declined, existing structures and created snag habitats still allow these habitats to be utilized by pileated woodpeckers.

In contrast, white-headed woodpeckers require habitats composed of ponderosa pine-dominated stands in a more open, park-like habitat condition. Silviculture structures used to identify white-headed woodpecker habitat include the multi-canopy stands with large diameter trees (OFMS and YFMS) and single-canopy stands with large diameter trees (OFSS). The fire area does not contain OFSS. White-headed woodpeckers were foraging in the YFMS and those stand conditions may provide adequate foraging and nesting structure because of more open conditions created by the fire. Typically, stand densities in white-headed woodpecker habitat are relatively low, and composed primarily of large, mature ponderosa pine, although other conifer species are often present (Garrett et al. 1996). The

quality of habitat for the white-headed woodpecker has improved because of the thinning effect from the fire and opening up the canopy. The level of expected secondary fire related mortality varies in these lower fire severity stands. Additional snags were created, providing abundant nesting habitat. Some large snags were created; snag surveys indicate densities of roughly 2.0 to 3.0 snags (>21" dbh) per acre. In live, green stands, DecAID suggests that white-headed woodpeckers need densities of snags ranging from 0.3 to 8 snags per acre greater than 10 inches DBH with 0.5 to 4 of these snags greater than 20 inches DBH (Mellen et al. 2003). White-headed woodpeckers are less reliant upon snags for foraging habitat and focuses more upon airborne insects and pinecone seeds, which are generally more abundant in the more open mature pine habitat conditions (Garrett et al. 1996).

DecAID provides post-fire data for white-headed woodpeckers, suggesting that the fire area could support use primarily at the 30% to 50% tolerance level (see table W-9). Several studies on white-headed woodpeckers, however, suggest the species is not closely associated with burned habitats (Hutto 1995, Sallabanks 1995, Raphael and White 1984, Saab and Dudley 1997), primarily because of the lack of many live trees. The species primarily forages on live, mature and old growth ponderosa pine, feeding on seeds from cones and scaling tree bark for insects. The species may use large, well-decayed snags in the burned area for nesting, if the burned area is within a potential home range that includes large, live ponderosa pine.

The sapsucker species and downy woodpecker are often associated with hardwood habitats in riparian areas; favored hardwood habitats include willow, alder, aspen, and cottonwood, particularly for the red-naped sapsucker and downy woodpecker (Csuti et al. 1997). However, all three species will utilize conifer forest habitat. The red-naped sapsucker will use conifer forests associated with aspen habitat (Csuti et al. 1997), while the Williamson's sapsucker will utilize a wide variety of conifer habitat types from upper elevation sub-alpine types, lodgepole pine types, Douglas and grand fir habitats, and ponderosa pine types (Csuti et al. 1997). Open ponderosa pine types are often selected for, particularly in Oregon (Csuti et al. 1997). Aspen and cottonwood habitats are limited within the project area. Riparian habitat degradation, conifer encroachment, livestock grazing, and other forces have resulting in declines and limited distribution of existing habitats.

Kotliar et al. (2002) describe the Williamson's and red-naped sapsucker, and downy woodpecker as species with either mixed response to burned habitats versus unburned habitats or they showed similar abundance levels in burned and unburned forests. DecAID and other recent research have not addressed habitat needs for these species within fire-affected habitats.

Sections of upper Camp Creek and lower reaches of the Little Malheur River burned at light fire severities. Post-fire, these areas are classified as earlier successional stands, generally stem exclusion closed canopy (SECC) and stem exclusion open canopy (SEOC). Therefore, in the lighter fire severity areas, habitat conditions likely remain suitable for species such as the red-naped and Williamson's sapsuckers, depending upon existing green vegetation cover. The abundance of smaller trees killed by the fire has likely increased insect populations, providing improved foraging habitat for the downy woodpecker. Conditions in the riparian areas are less suitable for the pileated woodpecker and the white-headed woodpecker, due to the lack of YFMS and OFMS.

Environmental Effects

The following analysis focuses on lightly burned habitat (2,847 acres). Effects discussion focuses on the thinning of live trees and reduction in snags. Discussion will focus primarily on the 852 acres of OFMS/YFMS, which provide nesting habitat for pileated and white-headed woodpeckers and to a lesser degree on younger structural stages - SEOC, SECC, UR and SI – which are primarily limited to foraging habitat. Effects to riparian areas will also be discussed, focusing on effects to the sapsuckers and downy woodpecker.

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, indirect, or cumulative effects were addressed.

Direct and Indirect Effects

Alternative 1 and 5

Implementation of Alternative 1 and 5 would not result in direct, indirect, or cumulative effects to snag-associated species or habitat. Habitats would be maintained, as they currently exist. See the Affected Environment section for discussion. The larger diameter trees will provide additional large snags in the short-term and in the future would provide down wood, a critical habitat component for pileated woodpeckers (Bull and Holthausen 1993) as well as pine martens (Ruggiero et al. 1994). In the long-term, stand densities, and structure complexity would re-develop and return to similar pre-fire conditions.

For the white-headed woodpecker, improved habitat conditions over 852 acres of habitat would be maintained through the short and mid-term. Fire-induced mortality would result in more open habitat conditions favored by the species. Habitat for the white-headed woodpecker would be maintained based on the expected survival of the large diameter ponderosa pine trees (about 5 per acre). Based on the tree mortality guidelines, about half or more of the large diameter trees will be snags within a few years and will provide nesting habitat as well. For white-headed woodpecker, 76% of the fire area would provide snag habitat at the 30% tolerance level and above (Table W-9).

In addition, structure complexity and diversity in the lightly burned areas is expected to provide suitable habitat for management indicator species such as Williamson's and red-naped sapsuckers, downy and hairy woodpeckers, as well as other landbirds such as mountain chickadees, brown creepers, flammulated owls, and pygmy nuthatches.

Alternative 2

The direct and indirect effects of Alternative 2 are related to habitat loss from commercial thinning and salvage harvest. There are 76 acres of commercial thinning and 674 acres of salvage harvest out of the 2,847 acres, i.e., about 25% of the light severity burned forest. Snags and green tree replacement habitats would be managed through the retention of large tree structure and management of snag densities at Forest Plan standards.

Commercial Thinning

Commercial thinning would have direct and indirect effects upon both the pileated and white-headed woodpecker through changes to habitat. Removal of live trees does not change the structural stage on any stand, but it does reduce canopy cover. Both pileated woodpecker and white-headed woodpeckers are associated primarily with OFMS and YFMS. Reduction in canopy cover could negatively affect pileated woodpeckers, but is likely to improve habitat for white-headed woodpeckers, which prefer more open stand conditions. The

number of OFMS/YFMS acres affected is 7 acres and is considered incidental for either species.

In the long term, commercial thinning would increase growth of the residual trees and develop a more single story old growth condition, the preferred habitat for white-headed woodpeckers.

Salvage Harvest

Alternative 2 proposes salvage harvest on about 172 acres of the 852 OFMS/YFMS acres, reducing potential nesting and foraging habitat for the pileated woodpecker and nesting habitat for the white-headed woodpecker in the fire area; roughly 20% of the total existing habitat present in the fire area. The remaining salvage acres are in younger structural stages that are not considered quality habitat for nesting, although they can provide foraging habitat. DecAID displays suggested snag densities in live, green stands for these two species. Alternative 2 would retain the Forest Plan standard of 2.4 snags per acre, meeting the suggested snag levels in DecAID for white-headed woodpecker, but being lower than levels suggested for pileated woodpeckers.

DecAID also provides woodpecker use data for white-headed woodpecker in post-fire habitats. Under the existing condition, 76 percent of the fire area meets or exceeds a 30 percent tolerance level for white-headed woodpecker. After implementation, 60 percent will meet or exceed the 30 percent tolerance level (see table W-9). These values may overstate changes in habitat; as stated previously, current research indicates that white-headed woodpeckers are not strongly associated with post-fire habitats.

At the subwatershed level, about 14,400 acres of mature and old-growth forest (YFMS and OFMS) remain; therefore, although harvest degrades habitat in the fire area, the subwatersheds continue to provide habitat for these species. Effects would be considered minimal; far less than 1% of habitat would be affected.

Harvesting snags in the riparian area of Camp Creek would remove nesting trees for red-naped and Williamson's sapsuckers, although snags would be left at Forest Plan standards and provide some nest trees. All logging would be done by helicopter and would have little effect to any emerging hardwood trees or shrubs. Downy woodpeckers typically use hardwoods for nesting, so no effects to nesting would be expected. Removing snags can reduce foraging habitat for downy woodpeckers; post-fire habitats provide an increase in insect populations. Effects would be expected to be minimal, given the level of acres treated, approximately 68 acres.

Alternative 3

The direct and indirect effects of Alternative 3 are related to habitat loss from salvage harvest. No commercial thinning is proposed. There are 324 acres of salvage harvest out of the total 2,847 acres, i.e., about 11% of the lightly burned forest. Snags and green tree replacement habitats would be managed through the retention of 13 snags per acre and an abundance of live trees, well above Forest Plan standards.

Salvage Harvest Only

Alternative 3 proposes salvage harvest on about 55 acres of the 852 OFMS/YFMS acres, reducing potential nesting and foraging habitat for the pileated woodpecker and nesting habitat for the white-headed woodpecker in the fire area; roughly 6% of the total existing

habitat present in the fire area. The remaining salvage acres are in younger structural stages that are not considered quality habitat for nesting, although they can provide foraging habitat.

The primary direct and indirect effects associated with the harvest activity proposed would be the reduction of snag densities in the 324 acres treated. This alternative would maintain 13 snags per acre. These snags would be distributed in size classes as described in Chapter 2. The primary indirect effect of this arrangement would be reduction of potential foraging and nesting snags. Of the 13 snags, at least 2.5 per acre would be greater than 21" dbh, or the maximum size available if snag diameters are less than that. This number of snags would likely result in an incremental reduction in habitat quality for both white-headed and pileated woodpeckers. These habitats would likely still provide suitable habitat. For pileated woodpeckers, habitat is also considered better than under Alternatives 2 and 4 given that no live, green trees expected to survive the fire would be removed; existing canopy levels would be maintained. DecAID displays suggested snag densities in live, green stands for these two species. At 13 snags per acre, Alternative 3 would retain snags at levels in excess of those suggested for white-headed woodpecker, but still less than the number of large snags recommended for pileated woodpecker.

DecAID also provides woodpecker use data for white-headed woodpecker in post-fire habitats. Under the existing condition, 76 percent of the fire area meets or exceeds a 30 percent tolerance level for white-headed woodpecker. After implementation, 64 percent will meet or exceed the 30 percent tolerance level (see table W-9). These values may overstate changes in habitat; as stated previously, current research indicates that white-headed woodpeckers are not strongly associated with post-fire habitats.

At the subwatershed level, about 14,400 acres of mature and old-growth forest (YFMS and OFMS) remain; therefore, although harvest degrades habitat in the fire area, the subwatersheds continue to provide habitat for these species. Effects would be considered minimal; far less than 1% of habitat would be affected.

Habitat for red-naped and Williamson's sapsuckers would be minimally affected because there would be no treatment in the riparian areas. Some nesting and foraging habitat would be reduced in areas adjacent to riparian areas. Foraging habitat for downy woodpeckers would also be reduced, but effects would also be low given the number of snags being retained.

Alternative 4

The direct and indirect effects of Alternative 4 are related to habitat loss from commercial thinning and salvage harvest. There are 76 acres of commercial thinning and 616 acres of salvage harvest out of the 2,847 acres, i.e., about 24% of the light severity burned forest. Green tree replacement habitats would be managed through the retention of large tree structure.

Commercial Thinning

Commercial thinning would have direct and indirect effects upon both the pileated and white-headed woodpecker through changes to habitat. Removal of live trees does not change the structural stage on any stand, but it does reduce canopy cover. Both pileated woodpecker and white-headed woodpeckers are associated primarily with OFMS and YFMS. Reduction in canopy cover could negatively affect pileated woodpeckers, but is likely to improve habitat for white-headed woodpeckers, which prefer more open stand conditions. The number of OFMS/YFMS acres affected is 7 acres and is considered incidental for either

species. Foraging habitat would be provided in the commercial thinning units where there would be 1.5 to 2.5 snags per acre retained, with the objective of retaining snags at or near the 2.5 level.

In the long term, commercial thinning would increase growth of the residual trees and develop a more single story old growth condition, the preferred habitat for white-headed woodpeckers.

Salvage Harvest

Alternative 4 proposes salvage harvest on about 155 acres of the 852 OFMS/YFMS acres, reducing potential nesting and foraging habitat for the pileated woodpecker and nesting habitat for the white-headed woodpecker in the fire area; roughly 18% of the total existing habitat present in the fire area. The remaining salvage acres are in younger structural stages that are not considered quality habitat for nesting, although they can provide foraging habitat. DecAID displays suggested snag densities in live, green stands for these two species. Alternative 4 would retain 1.5 to 2.5 snags per acre, meeting the suggested snag levels in DecAID for white-headed woodpecker, but being lower than levels suggested for pileated woodpeckers.

DecAID also provides woodpecker use data for white-headed woodpecker in post-fire habitats. Under the existing condition, 76 percent of the fire area meets or exceeds a 30 percent tolerance level for white-headed woodpecker. After implementation, 64 percent will meet or exceed the 30 percent tolerance level (see table W-9). These values may overstate changes in habitat; as stated previously, current research indicates that white-headed woodpeckers are not strongly associated with post-fire habitats.

At the subwatershed level, about 14,400 acres of mature and old-growth forest (YFMS and OFMS) remain; therefore, although harvest degrades habitat in the fire area, the subwatersheds continue to provide habitat for these species. Effects would be considered minimal; far less than 1% of habitat would be affected.

In harvest units snags existing prior to the fire (soft snags) would be left except for those identified as hazard trees along open roads. Retaining approximately 11 leave patches (approximately 338 acres) ranging from 4 to 90 acres would provide a foraging source nearby salvage harvest units. There would be no additional trees left for snags, except for units 3 and 12 where an additional 1.5 to 2.5 snags per acre would be retained. Salvage activities would have negative effects on pileated woodpeckers and white-headed woodpecker due to the decrease in existing and future habitat. For the pileated woodpecker, this would result in the decline in important habitat features, especially in the future when there is no or low recruitment of large diameter ponderosa pine snags and down logs.

Habitat for the white-headed woodpecker would be reduced by harvest of large diameter snags. Although salvage treatments would eliminate nesting habitat, commercial thinning units and salvage units 3 and 12 would provide 1.5 to 2.5 snags per acre (with the objective of retaining snags at the upper end of the range), as suggested in literature for white-headed woodpeckers (Matz 1927, Mellen et al. 2003).

Habitat for red-naped and Williamson's sapsuckers would be minimally affected because there would be no treatment in the riparian areas. Some nesting and foraging habitat would be reduced in areas adjacent to riparian areas. Foraging habitat for downy woodpeckers

would also be reduced, but effects would also be low given the number of snags being retained.

Hazard Trees

Effects Common to Alternatives 2, 3, and 4

Harvest does raise the risk of blowdown of residual snags. Alternatives leave a varying mix of snag densities. Snags will be distributed in larger, non-harvested blocks, small patches or dispersed. Blowdown risk is reduced when snags are left in untreated patches. In the light severity burn areas, snags are interspersed with live trees, reducing the risk of blowdown as well. Estimated snag fall down rates incorporate losses expected from blowdown.

In salvage units, snags may need to be felled for operational or safety needs during logging (i.e., landings, skyline corridors, safety). Forest Service personnel contacted the Oregon Occupational Safety and Health Administration (OSHA) for their input on this issue (communication between J. Hensley, Malheur National Forest and L. Wenick, Oregon OSHA, January 2004). Based on discussions with OSHA, logging in fire salvage sales could require that an estimated 5 to 10% of protected snags be felled to meet operational/safety needs. The need to fell protected snags is reduced when salvage logging is conducted within 2 to 3 years post-fire; most snags are still in a *hardened* condition that makes them less of a risk of being danger trees. In the Monument Fire Recovery project, design and mitigation features have been included in the action alternatives to further reduce the potential for loss of protected snags. In salvage units, snags marked for retention would be clumped, where possible for Alternatives 2 and 3. Alternative 4 designated snag patches that would be left un-harvested in salvage units, separating workers from snag hazards.

If a tree marked for snag retention is required to be felled for operational needs, a green snag of equal or larger size planned for harvest would be left as a replacement, where feasible. The fell tree would not be removed. The loss of protected snags would likely be less than 1 to 2%. This would be considered incidental given the level of snags being left.

Downed Log Habitat

Affected Environment

The fire itself affected much of the down log habitats that existed prior to the Monument Fire. In most cases, down logs were completely consumed. Remaining logs were generally charred and burned beyond useable conditions for wildlife species. The result is a reduction in available down log habitat immediately post fire and Forest Plan standards for down wood were likely not met. However, not long after the fire was put out, fire killed trees began replacing these burned log habitats.

DecAID identifies various percent cover levels for three different tolerance limits. Percent cover describes that actual level of ground coverage of a piece of down log, based upon its size and mass. A large piece of wood with greater diameter and/or length would cover a larger percentage of a ground area than a smaller piece of wood. This data is based upon CVS and other forest inventory information. Limited levels of down logs are typically present in ponderosa pine-Douglas fir stands with open canopies. The 30 and 50 percent tolerance levels indicated percent ground cover of 0 to 1.7% for logs > 5" diameter at the small end, > 3.3 feet in length. Only 20 percent of the plot areas contained a percent

coverage of 1.7% or greater for all material > 5". For material > 20" diameter and > 3.3 feet in length, no detections were identified, indicating very low densities and poor distribution of such habitats (Mellen et al. 2003).

DecAID also describes the distribution of the limited down log cover across the landscape. For logs greater than 5" diameter, 31% of the area had 0 percent cover, and 66% of the area had < 1% log cover. For logs > 20" diameter, 78% of the area had no detections, while 91% had < 1% log cover. Not only is down log habitats in this habitat type low in density, they are poorly distributed, particularly in the larger size classes.

The amended Forest Plan provides standards for down log habitats to be maintained for various habitats. In ponderosa pine habitat types, a total of 20 to 40 linear feet, made up of 3 to 6 pieces, each > 6 feet in length and 12" diameter at the small end are required. In mixed conifer habitat types, a total of 100 to 140 linear feet, made up of 15 to 20 pieces, each > 6 feet in length and 12" diameter at the small end are required. This direction refers to the average density per acre.

Environmental Effects

Direct and Indirect Effects

All alternatives would meet or exceed Forest Plan standards for down log retention as described in the amended Forest Plan (USDA Forest Service 1990, amended 1996). Alternatives 1 and 5 would exceed down log standards because all snags would be available to be recruited dead wood material. As time passes after the fire event, increasing levels of down logs will be available, far exceeding the Forest Plan, as well as levels identified in DecAID. Likewise, distribution patterns would exceed levels described in the same section, based upon DecAID.

Alternatives 2, 3, and 4 would exceed Forest Plan standards through the design criteria identified in Chapter 2 of the FEIS. By the time of implementation, it is expected that additional snags will have fallen (and remain on site) exceeding the Forest Plan standard. Percentage cover of down log material would exceed the lowest levels identified in the DecAID (discussed in the Affected Environment section). Due to wilderness designations and other set-asides (depending upon alternative), a large percentage of the fire area will not be affected by the alternatives. Hence, such down log levels would be well within the distribution information provided by DecAID. Suitable down log habitat would be provided across the landscape, and at the site-specific level.

Cumulative Effects - PCE and Down Wood

All of the activities identified as past, ongoing, or foreseeable have been considered for their cumulative effects on primary cavity excavators. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute positive or negative effects to the species or its habitat.

There are essentially no cumulative effects for Alternatives 1 and 5 because there would be no activities that would contribute negatively or beneficially to past, ongoing, or foreseeable future activities. The only difference between Alternatives 1 and 5 is the planting and replanting conifers proposed in Alternative 5. This would restore vegetation cover sooner than without planting conifers, potentially reducing the length of the snag gap expected once snags created by the Monument Fire fall down.

Past timber harvest actions; the Awake prescribed fire project; the reduction in habitat from the fire itself; and firewood cutting can remove snags and down logs, complex ground structures, and snags would add cumulatively to the effects from proposed activities. Because logging is unique among the disturbances in removing boles, and because of the importance of boles in contributing structure to habitats, logging in the low and moderately burned areas is more likely to affect habitat quality than other disturbances (Ruggiero et al. 1994).

Past regeneration harvest prescriptions, overstory removal treatments, understory thinning, and prescribed fire implementation actions have contributed to a loss of suitable habitat for the pileated woodpecker. Since 1993, the Forest Plan as amended, has directed the Malheur National Forest to conduct timber sales in a manner that moves stands towards OFMS and OFSS structural stages, and timber sales planned since that time should not have contributed to loss of mature and old growth forest. Alternative 2 and 4 could contribute cumulative effects to the pileated woodpecker through a reduction in available habitat resulting from thinning activities associated with commercial thinning treatments and removal of large diameter snags; however, reductions would be considered incidental. Alternative 3 would only remove snags, and the level of treatment in suitable habitat is also considered incidental.

Road closure actions proposed in Alternatives 2, 3, 4, and 5 would reduce potential effects of firewood gathering on dead wood habitats through reduction in access. Alternative 5 would reduce the potential of snag removal by firewood cutting more than Alternatives 2, 3, and 4 because more miles of roads would be closed. Alternative 1 would not change current road management and would maintain existing access. It is not expected that firewood cutting would have the same level of effect to snags or down logs that the harvest alternatives would have, but there is more potential for snags to be cut along roads if the no action alternative was chosen. Firewood cutting would be delayed until 2008 to reduce effects to woodpecker species, particularly those that use post-fire habitats first, i.e., black-backed, three-toed, and hairy woodpeckers. After 4 years post-fire, use by these species tends to decline naturally.

About 0.5 miles of temporary road construction would occur under Alternatives 2, 3, and 4. The proposed temporary roads would be constructed in open areas to access helicopter landings. The level of effects on snags and deadwood habitats would be insignificant because of the small amount proposed to be constructed and the location of the proposed temporary roads. Those actions are not expected to add to the cumulative effects of other past road construction activities, especially considering the temporary roads would be closed and additional miles of road closures planned for Alternatives 2, 3, and 4.

The Whitman Unit of the Wallowa-Whitman National Forest is proposing harvest of fire-killed trees on its portion of the Monument fire. About 3,711 acres of the Monument Fire burned on the Wallowa-Whitman NF; a total of 779 acres of these burned habitats are proposed for salvage harvest on the Wallowa-Whitman NF's portion of the burn or 20% of the burned acres. In addition, about 628 acres that burned on private land in holdings adjacent to the Wallowa-Whitman NF lands have been salvaged.

Activities proposed by the Wallowa-Whitman NF are primarily salvage actions in higher fire severity areas. Their proposed action for that project is similar to this project's proposed action. Mixes of helicopter, skyline, and tractor harvest methods are proposed. The Wallowa-Whitman NF proposes to maintain Forest Plan standards for snag and down log retention, similar to Alternative 2. Snags would be distributed on a 40-acre basis, as described in the Wallowa-Whitman's Forest Plan (Joel Waldo, Fisheries/Wildlife Biologist,

Wallowa-Whitman NF, personal comm., May 2003). The Wallowa-Whitman NF's project and analysis are on similar timelines to this analysis, with expected implementation occurring in 2004.

As with Monument, the Wallowa-Whitman NF would provide large areas of untreated snags. Alternatives 2, 3, and 4 proposed in this project would add incremental cumulative effects with activities proposed by the Wallowa-Whitman NF across the fire area. Overall, about 11,475 acres of undisturbed down wood habitat is present in the Monument Rock Wilderness portion of the fire area on Prairie City RD in addition to what is present on the Unity RD portion of the Wilderness. Snag habitats would continue to provide for PCE species at the landscape level.

Summary - PCE

Tolerance levels have less to do with viability of species and populations, and more to do with the distribution of individuals across a project area. The alternatives represent different levels of snag retention, and thus would affect woodpecker presence and distribution. The Alternative 1 (the No Action Alternative) and Alternative 5 (no salvage or thinning activities) would maintain snag habitats across the entire fire area. Currently, about 8,319 acres of suitable habitat exists in the project area in addition to 11,475 acres of burned forested habitat in the Wilderness area. Species such as the black-backed and three-toed woodpeckers would rapidly colonize stand-replacement burns within 1 to 2 years of the fire; however, within 5 years they would decline, presumably due to declines in bark and wood-boring beetles (Kotliar et al. 2002). For other species, such as the Lewis' woodpecker, northern flicker and hairy woodpecker, suitable habitat conditions will persist longer, upwards of 25 to 30 years. Once the majority of snags fall, cavity excavators would not likely occupy the area, or they would exist at greatly reduced levels.

Tables W-5 through W-9 displays cavity excavator use or tolerance levels as an overall range for cavity excavator species. Values provide a relative difference between alternatives. Alternatives 1 and 5 support the highest tolerance levels for most primary cavity excavators. Of the alternatives with salvage and/or thinning activities, Alternative 3 (salvage activities only) supports the highest tolerance levels for most primary cavity excavators. Alternatives 2 and 4 (salvage and thinning activities) support essentially the same tolerance levels for primary cavity excavators.

A further comparison of alternatives with salvage activities is to compare the amount of acres of suitable habitat protected, either in "reserve patches" specifically established for woodpecker species or non-salvage areas established for other reasons, e.g., wilderness protection, RHCA protection or low economic viability. These unlogged patches are particularly important to species such as the black-backed and three-toed woodpeckers that may use unlogged burn areas as source habitats to maintain populations across the landscape. Under Alternative 2, about 13,465 (79%) acres of burned forested habitat will not be treated in the project area. Under Alternative 3, about 14,475 (85%) acres of burned forested habitat will not be treated in the project area. Under Alternative 4, about 14,341 (85%) acres of burned forested habitat will not be treated in the project area. Untreated acres for each alternative include the 11,475 acres of burned forested habitat in the Monument Rock Wilderness area.

Effects to suitable habitat for woodpecker species are primarily in high severity fire-affected habitat where salvage activities are proposed under Alternative 2, 3, and 4. Alternatives 2

and 4 propose thinning in light severity fire-affected habitat, where about 7 acres of habitat for white-headed and pileated woodpeckers will be commercially thinned. Thinning activities would have inconsequential effects to woodpecker species.

While snags are abundant after a fire, once they fall down, they will not be available again until a new forest develops, trees reach sizes useful for woodpeckers, and these trees begin to die. The period when snags are not available can be referred to as the “snag gap.” Although snag levels currently exceed Forest Plan standards, it is expected that most post-burn snags will be on the ground within 30 years. The time it takes to reforest burn areas differs between natural regeneration and planting. Natural regeneration can delay reforestation by 10 to 50 years depending on the availability of a live tree seed source. Alternative 1 relies on natural regeneration compared to the action alternatives that include planting. Regeneration of forested areas in the project area will be quicker under the action alternatives compared to Alternative 1. If larger snags persist longer than expected, the snag gap would be reduced further, particularly for Alternatives 1 and 5, which retain the most large diameter snags.

Dead Wood Habitat

Forest Plan standards and levels suggested by DecAID for down wood would be met under all alternatives. Alternatives 1 and 5 would provide the greatest amount of down wood compared to the Alternatives 2, 3, and 4 in the project area. Overall, about 11,475 acres of undisturbed down wood habitat is present in the Monument Rock Wilderness portion of the fire area on Prairie City RD.

Rocky Mountain Elk

Rocky Mountain elk is an MIS because of its importance as a commonly hunted species (Malheur Forest Plan). Elk are widely distributed across the District, Forest, and the Blue Mountain region. The Forest Plan identifies standards for attributes of elk habitat, including thermal cover, forage, winter range, road densities, and overall habitat effectiveness.

Cover – Summer Range

Affected Environment

Based on individual tree mortality guidelines (Scott et al. 2002), many large diameter ponderosa pine trees that appear to be alive are dead or dying and will lose their green canopy. Those trees will not contribute to cover for analysis purposes. The existing forest structure created by this stand replacement fire further reflects the lack of either satisfactory or marginal cover in the project area. Generally, the Monument Fire caused the older structures such as OFMS to move to younger structural stages such as SI, UR, or SEOC (see tables V-4 and V-5, Forest Vegetation Section/ figure 16, Map Section).

In summer range, the Forest Plan directs a total cover value of 20%, with satisfactory cover maintained at a minimum of 12%, and marginal cover minimum of 5% (Forest Plan, Chapter IV, Forest Wide Standards, Standard 28). Table W-2 identifies the existing cover condition for the two subwatersheds compared to the Forest Plan standards.

Table W-10. Comparison of big game cover, winter and summer range. Winter range is not present in the Swamp Creek subwatershed.

| Cover Type | Forest Plan Standards Summer | Forest Plan Standards Winter | Swamp Creek Subwatershed Percentage in Summer Range | U. Little Malheur R. Subwatershed Percentage in Summer Range | U. Little Malheur R. Subwatershed Percentage in Winter Range |
|--------------|------------------------------|------------------------------|---|--|--|
| Satisfactory | 12% | 8% | 27% | 5% | 17% |
| Marginal | 5% | 10% | 8% | 9% | 2% |
| Forage | N/A | N/A | 65% | 86% | 81% |
| Total Cover | 20% | 20% | 35% | 14% | 19% |

The Monument Fire is the single largest disturbance that has led to the current cover condition in the Upper Little Malheur River subwatershed. In addition, past timber activities have also affected cover conditions. In summer range, the Upper Little Malheur River subwatershed does not meet Forest Plan standards for satisfactory and total cover requirements.

In the Swamp Creek subwatershed, primary effects to cover habitat have come from a combination of past harvest activities and fire disturbances. This subwatershed meets the Forest Plan standard for cover in summer range.

There are no known areas of fawning or calving habitat in the project area. Hiding cover would provide fawning or calving habitat in the lower elevation riparian areas that retains adequate forest structure and where forage is nearby, and where no open roads exist to disturb deer or elk. Currently, there is very little of this habitat in the project area.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct or indirect were addressed.

Alternative 1 (No Action)

Direct and Indirect Effects

Cover habitat would not change with selection of the No Action Alternative. There would be no direct effects to big game habitat. Cover conditions in the short-term would remain the same as those identified in the Affected Environment description. There is risk of some level of mid-term effects upon cover habitat (remaining live trees) in the project area. Secondary mortality effects associated with elevated insect activities within the fire area may result in loss of cover habitat. Continued mortality in all canopy levels would result in declines in canopy closure and security habitat where it currently exists, reducing effectiveness of these habitats. Estimated levels of cover loss are unknown due to the unpredictable nature of such mortality effects. These effects would likely be measurable 3 to 5 years post fire.

Over the long-term, depending upon the level of secondary mortality, areas currently in a cover condition would develop denser canopies and more complex structures, adding to the overall cover value of those habitats. These changes would result from the diversity of tree species present, coupled with the additional growing space and opening of the canopy resulting from low intensity fires that burned through these stands. These stands would likely develop similar stand densities, structures, and tree species diversities as existed before

the fire. The result would be similar big game cover conditions to what existed preceding the Monument Fire.

Indirect effects would focus on delays to recovery of cover habitat over the mid- and long-term. Delays would occur due to lack of planting of conifers in the project area. Natural regeneration could be delayed for decades in all moderately and severely burned areas due to lack of seed sources, particularly in interior portions of the project area where few or no live conifers exist post fire.

Alternatives 2 and 4

Direct and Indirect Effects

Cover habitat would not change with the selection of Alternative 2 or 4. There would be no effects to big game cover from salvage activities. Cover conditions in the short-term would remain the same as those identified in the Affected Environment description. There is risk for some level of mid-term effects upon cover habitat in the project area. Secondary mortality effects associated with elevated insect activities within the fire area may result in loss of cover habitat. Continued mortality in all canopy levels would result in declines in canopy closure and security habitat where it currently exists, reducing effectiveness of these habitats. Estimated levels of cover loss are unknown due to the unpredictable nature of such mortality. These effects would likely be measurable 3 to 5 years post fire.

There would be no cover harvested during thinning activities, therefore no short-term effects are expected and are similar to the effects of Alternative 1 and 5. Mid-term, the commercial thinning would decrease secondary mortality from insect and disease to the remaining live trees. The thinning would reduce inter-tree competition between residual live trees that will promote stand resiliency.

Planting conifers would help reestablish cover in the project area. Cover will likely return to satisfactory levels in 70 to 110 years.

The Swamp Creek subwatershed would continue to meet Forest Plan standards for satisfactory, marginal and total cover. For the Upper Little Malheur River subwatershed, total cover and satisfactory cover would not meet Forest Plan standards in summer range. Road closures and planting would help reestablish calving and fawning habitat in the lower elevation riparian areas sooner than Alternative 1.

Alternatives 3

Direct and Indirect Effects

Cover habitat would not change with the selection of this alternative. There would be no effects to big game cover from salvage activities. Cover conditions in the short-term would remain the same as those identified in the Affected Environment description. There is risk for some level of mid-term effects upon cover habitat in the project area. Secondary mortality effects associated with elevated insect activities within the fire area may result in loss of cover habitat. Continued mortality in all canopy levels would result in declines in canopy closure and security habitat where it currently exists, reducing effectiveness of these habitats. Estimated levels of cover loss are unknown due to the unpredictable nature of such mortality. These effects would likely be measurable 3 to 5 years post fire.

Over the long-term, depending upon the level of secondary mortality, areas currently in a cover condition would develop denser canopies and more complex structures, boosting overall cover value of those habitats. These changes would be the result of additional growing space created in moderately and severely burned pockets within lightly burned

stands. These stands would likely develop similar stand densities, structures, and tree species diversities to those existing before the fire. The mid-term and long-term result would be similar big game cover conditions that existed before the fire.

The effects of planting to develop long term cover for Alternative 3 is the same as Alternatives 2 and 4.

The Swamp Creek subwatershed would continue to meet Forest Plan standards for satisfactory, marginal and total cover. For the Upper Little Malheur River subwatershed, total cover and satisfactory cover would not meet Forest Plan standards in summer range. Road closures and planting would help reestablish calving and fawning habitat in the lower elevation riparian areas sooner than Alternative 1.

Alternative 5

Direct and Indirect Effects

Cover habitat would not change with the selection of this alternative. There would be no effects to big game cover. Cover conditions in the short-term would remain the same as those identified in the Affected Environment description. There is risk for some level of mid-term effects upon cover habitat in the project area. Secondary mortality effects associated with elevated insect activities within the fire area may result in loss of cover habitat. Continued mortality in all canopy levels would result in declines in canopy closure and security habitat where it currently exists, reducing effectiveness of these habitats. Estimated levels of cover loss are unknown due to the unpredictable nature of such mortality. These effects would likely be measurable 3 to 5 years post fire.

Over the long-term, depending upon the level of secondary mortality, areas currently in a cover condition would develop denser canopies and more complex structures, boosting overall cover value of those habitats. These changes would be the result of additional growing space created in moderately and severely burned pockets within lightly burned stands. These stands would likely develop similar stand densities, structures, and tree species diversities to those existing before the fire. The mid-term and long-term result would be similar big game cover conditions that existed before the fire.

In Alternative 5, cover will be nonexistent in the moderately burned areas, where planting will not occur, for decades due to lack of seed sources, particularly in interior portions of the project area where few or no live conifers currently exist. In severely burned areas where planting is proposed, development of long term cover under Alternative 5 would be same as Alternatives 2 and 4.

The Swamp Creek subwatershed would continue to meet Forest Plan standards for satisfactory, marginal and total cover. For the Upper Little Malheur River subwatershed, total cover and satisfactory cover would not meet Forest Plan standards in summer range. Road closures would help reestablish calving and fawning habitat in the lower elevation riparian areas sooner than Alternative 1.

Cover - Winter Range

Affected Environment

About 952 acres of winter-range habitat was burned in the Monument Fire. The winter range is in the southern part of the Upper Little Malheur River subwatershed. It is in the northernmost portion of a larger winter range several miles wide that extends south along the entire boundary of the Prairie City and Emigrant Creek Ranger Districts. Most of the habitat

on the Forest was forested, however juniper woodlands, sagebrush steppe, and open scrub habitats are also present, which provides foraging areas. Most of the forested habitat was intact, without previous harvest activities. In the forest habitat of the winter-range area, 677 acres burned in the moderate-high to severe fire-severity, eliminating all satisfactory and marginal cover habitats. Small pockets of unburned or lower-severity burn habitat exist, but are too small to map.

In winter range the standard for marginal cover is 10%, satisfactory cover, and the total cover value is the same as summer range at 20% (Forest Plan, Management Area 4A, Standard 14). In winter range, the Upper Little Malheur River subwatershed does not meet the Forest Plan standards for marginal cover and total cover (see Table W-10). Winter range is not present in the Swamp Creek subwatershed.

About 258 acres burned in a light fire-severity condition, and 18 acres burned in a partial fire-severity condition. These fire severities occurred primarily in sagebrush steppe, juniper woodland, and ponderosa pine woodland habitats where canopy closures and tree densities were low. Damage in the low-intensity ground fires ranged from pockets of mortality in upper canopy trees to tree mortalities of 80%. The low mortality damage fires will cause minimal changes to cover condition (primarily ground-level security cover provided by shrubs and small trees that were killed by the fire) and stimulation of browse and herbaceous forage.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, or indirect effects were addressed.

Alternative 1 (No Action)

Direct and Indirect Effects

Selection of the No Action Alternative would not result in direct effects to the condition of winter range habitat or the Rocky Mountain elk and mule deer that utilize those habitats. There would be no change to existing condition of habitat.

Indirect effects associated with selection of this alternative would occur with delays in suitable hiding/security and thermal cover that would occur while waiting for natural regeneration to occur. The selection of this alternative would result in an opportunity lost to replant suitable forestlands on approximately 600 acres of habitat. Restoration of suitable habitat providing cover habitats could exceed 50 to 70 years, based upon the severity of the fire and lack of seed producing trees. This may change distribution and utilization of this habitat by wintering deer and elk.

The Upper Little Malheur River subwatershed would not meet Forest Plan cover standards in winter range under Alternative 1.

Alternatives 2, 3, and 4

Direct and Indirect Effects

Implementation of these alternatives would result in planting of conifers in habitats formerly forested in winter range area. This would enhance the recovery period for development of cover habitats lost to the Monument Fire

Alternative 3 and 4 would not enter riparian habitats and would result in the retention of all dead material within riparian buffer areas. This would result in an incremental difference in

short term hiding/security cover provided by dead boles of the fire-killed trees. The overall benefit of this retention is minimal, and not expected to influence habitat use.

Direct effects to wintering deer and elk would be possible with Alternatives 2, 3, and 4. Each of these alternatives involves some level of harvest activity, yarding with helicopter equipment, landing, and loading activity, and haul of logs off site. These activities represent disturbances that could affect habitat use. Several standards identified for MA-4A winter range habitat concern limiting or preventing such disturbances that would affect winter range habitat utilization (USDA Forest Service, 1990). These disturbances are of greatest concern between December 1 and April 1 when use of winter habitats is most likely. Winter logging operations are likely to occur due to urgency to remove the dead and dying trees in a timely manner to capture their economic value. While it would be possible for harvest related disturbances to adversely affect function of this winter range habitat, the likelihood of occupancy of these areas is low due to the effects of the fire and adverse effects to cover habitats and some browse forage habitats. This would reduce potential for affect to wintering deer and elk. Design criteria are established, (described in Chapter 2) that would initiate monitoring activities to determine habitat utilization and effects of harvest actions on any animals that may be using the affected winter range areas. Harvest activities would continue unless monitoring determines there are significant or prolonged effects on wintering deer and elk.

The Upper Little Malheur River subwatershed would not meet Forest Plan cover standards in winter range under Alternatives 2 or 4.

Alternative 5

Direct and Indirect Effects

Selection of this alternative would not result in direct effects to the condition of winter range habitat c or the Rocky Mountain elk and mule deer that utilize those habitats. There would be no change to existing condition of the habitat.

Long-term indirect effects would occur because of delays in the development of suitable hiding cover and thermal cover in moderately burned areas. The selection of this alternative would result in an opportunity lost to replant moderately burned areas. Restoration of suitable habitat providing cover habitat could exceed 70 years, based upon the severity of the fire and lack of seed-producing trees. This may affect distribution and utilization of this habitat by wintering deer and elk.

The Upper Little Malheur River subwatershed would not meet Forest Plan cover standards in winter range under Alternative 5.

Roads

Affected Environment

Impacts from roads on wildlife within the project area vary in different drainages.

Influencing factors include the local density of those roads, impacts of past harvest activity, relative use by motorized vehicles and equipment, and effects of the Monument Fire on surrounding forested habitats. These factors affect the distribution, habitat selection, and use of habitats by big-game species such as the Rocky Mountain elk and mule deer, and influence distribution of other species such as large carnivores (Wisdom et al., 1999; Rowland et al., 2000).

The road density measurements were done at the subwatershed scale. However, road densities within the subwatersheds do not properly illustrate impacts of roads on big game animals and some forest carnivores. Road density should be considered relative to the large number of acres of roadless areas.³⁹ These larger areas of unroaded areas (through wilderness and other management designations), while providing roadless habitat, also bias subwatershed level road densities causing densities to appear lower than what is reflected in general forest managed areas. The Upper Little Malheur River subwatershed is most affected by these unroaded areas.

The Forest Plan standard for road densities is ≤ 3.2 miles/square mile in big-game summer range and ≤ 2.2 miles/square mile in big-game winter range. Currently, road density in the Swamp Creek subwatershed is meeting the Forest Plan standard (Table W-11). The current road density in the Upper Little Malheur River subwatershed is meeting the Forest Plan standard for summer range, but exceeds standards for winter range (Table W-11).

Table W-11. Road densities by subwatershed and Project Area based on range type, existing condition. Winter range is not present in the Swamp Creek subwatershed.

| Land Area Description | Miles of Open Road | Existing Road Density (miles/mile ²) | Forest Plan Standard (miles/mile ²) |
|---|--------------------|---|--|
| Swamp Creek Subwatershed (Summer Range) | 94.2 | 2.3 | 3.2 |
| Upper Little Malheur River Subwatershed (Summer Range) | 90.4 | 2.5 | 3.2 |
| Upper Little Malheur River Subwatershed (Winter Range) | 21.8 | 3.2 | 2.2 |

Changes in big game distribution due to road disturbance are likely to be magnified by effects of the fire upon security cover. Roughly, 5,000 acres (64%) of habitat in the project area burned at moderate-high to severe fire intensity. Hence, a significant portion of the project area no longer contains vegetation to buffer the effects of those open roads.

Recent work at the Starkey Experimental Station has dealt with the effects of roads and impact upon distribution of elk and deer across a landscape. One of the key findings involved distribution of elk and how they selected habitat. Researchers found a strong correlation between road activity and habitat selection. Roads with as little use as less than one vehicle per 12-hour period average were affecting habitat selection out to 1,000 meters or more. A summation of detections over a number of years of tracking uncovered a strong selection for habitats beyond that 1,000 to 1,100 meter “buffer” around open, driven roads. Currently, there are no areas $> 1,000$ meters from open roads in the project area.

³⁹ (e.g. Monument Rock Wilderness in the Upper Little Malheur River and Swamp Creek subwatersheds, and a semi-primitive motorized recreation area in the Spring Creek subwatershed)

Conversely, mule deer responded to distribution of elk by avoiding areas of higher elk density. That avoidance put mule deer closer to roads, according to their radio collar detections. Their selection for cover habitat was also very strong, especially in the first few hundred meters of an open road.

Road traffic in the project area in a typical year fluctuates. With exceptions of FSR 1370 leading to Table Rock Lookout, FSR 1672457 leading to the Little Malheur River trailhead, and FSR 16, the area receives inconsistent and limited level of vehicular traffic. Traffic is minimal particularly during the spring and early summer months. During big-game hunting seasons from late August through the end of November, vehicle traffic is very high.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, or indirect were addressed.

Alternative 1 (No Action)

Direct and Indirect Effects

Implementation of Alternative 1 would maintain the existing conditions of road distribution and densities in the project area. This would maintain effects of road presence and use upon big game distribution as described in the affected environment. There would be no direct or indirect effects to that existing condition and effects those roads have on elk habitat utilization.

Alternatives 2, 3, and 4

Direct, and Indirect Effects

The same road management plan is proposed under Alternatives 2, 3 and 4 (see Figure 12, Map Section). A total of about 7 miles of currently open roads would be closed in the project area. Additionally, about 4.8 miles of road would be closed or otherwise decommissioned.

Open road density is currently meeting the Forest Plan standard in the Swamp Creek subwatershed. No currently open roads are proposed for closure in Swamp Creek subwatershed (W-12). Four-tenths of a mile of an existing closed road is proposed for decommission in this subwatershed.

Table W-12. Miles of road per square mile by subwatershed in summer and winter range, Alternatives 2, 3, and 4. Winter range is not present in the Swamp Creek subwatershed.

| Land Area Description | Open Road Miles/Proposed Closures | Road Density/FP Standard |
|---|--|--|
| Swamp Creek Subwatershed (Summer Range) | 94.2 miles open/ 0.0 miles proposed for closure | 2.3 miles/mi ² / 3.2 mi/mi ² |
| Upper Little Malheur River Subwatershed (Summer Range) | 75.5 miles open/ 14.9 miles proposed for closure | 1.8 miles/mi ² / 3.2 mi/mi ² |
| Upper Little Malheur River Subwatershed (Winter Range) | 20.6 miles open/ 1.3 miles proposed for closure | 3.0 miles/mi ² / 2.2 mi/mi ² |

Note: Rounding road miles during calculations may result in minor (.1 mile) discrepancies between alternatives.

Open road density in summer range in the Upper Little Malheur River subwatershed is meeting the Forest Plan standard (W-12). However, because of the reduction in hiding following the fire, and watershed concerns (see Aquatics section) about 15 miles of currently open roads are proposed for closure. This will reduce the open road density in summer range from 2.1 to 1.8 miles per square mile (Table W-12).

Open road density in winter range in the Upper Little Malheur River subwatershed is not meeting the Forest Plan standard (W-12). About 1.3 miles of open road are proposed for closure. This will reduce the open road density in winter range changes from 3.2 to 3.0 miles per square mile (Table W-12).

Changes in elk distribution may result from vehicle activity and salvage activities during implementation of the proposed activities. Following implementation of proposed road closures, 35 acres of habitat > 1000 meters from an open road would be created in the project area.

Alternative 5

Direct and Indirect Effects

Under Alternative 5, an additional 9 miles of road would be closed in addition to closures proposed under Alternatives 2, 3 and 4, (see Figure 13, Map Section). The additional road closures were proposed in response to comments to the DEIS over concerns about noxious weeds and big game cover. About 16.2 miles of roads would be closed and about 4.8 miles of road would be decommissioned under Alternative 5.

In Swamp Creek subwatershed, four miles of open road would be closed reducing the open road density from 2.3 to 2.2 miles per square mile (Table W-13). Open road density would be below the maximum standard of 3.2 miles per square mile.

Table W-13. Miles of road per square mile by subwatershed in summer and winter range, Alternative 5. Winter range is not present in the Swamp Creek subwatershed.

| Land Area Description | Open Road Miles/Proposed Closures | Road Density/FP Standard |
|---|--|--|
| Swamp Creek Subwatershed (Summer Range) | 90.2 miles open/ 4.0 miles proposed for closure | 2.2 miles/mi ² / 3.2 mi/mi ² |
| Upper Little Malheur River Subwatershed (Summer Range) | 70.1 miles open/ 20.3 miles proposed for closure | 1.7 miles/mi ² / 3.2 mi/mi ² |
| Upper Little Malheur River Subwatershed (Winter Range) | 20.1 miles open/ 1.7 miles proposed for closure | 2.9 miles/mi ² / 2.2 mi/mi ² |

In summer range in Upper Little Malheur River subwatershed, there would be 20.3 miles of road closures, reducing the open road density from 2.5 to 1.7 miles per square mile (Table W-13). Open road density is would below the maximum Forest Plan standard of 3.2 miles per square mile.

In winter range of the Upper Little Malheur River subwatershed, there would be 1.7 miles of closures, reducing the open road density from 3.2 to 2.9 miles per square mile (Table W-13).

Winter range would continue to be above the maximum Forest Plan standard of 2.2 miles per square mile.

Changes in elk distribution may result from vehicle activity and salvage activities during implementation of the proposed activities. Following implementation of proposed road closures, 37 acres of habitat > 1000 meters from an open road would be created in the project area.

Forage

Affected Environment

Identified forage habitat in the analysis area totals about 43,644 acres (77% of the analyzed area). The extent of fire-damage to root crowns and root systems of herbaceous species and shrubs will determine the level of forest vegetation response to the 2002 fire. Where fire severities were high enough to kill existing vegetation, availability of seed sources will also be a factor in vegetation response. Much of the fire area burned at a severe fire-severity level (11,800 acres or 58%). In areas where down log and other forest floor fuel levels were high, response of forage vegetation may be less or non-existent due to mortality. In lower fire severity areas, impacts are less severe and site specific (i.e. associated with high down log concentrations, etc.). These low severity areas are expected to respond with a flush of growth over the next two years.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, indirect, or cumulative effects were addressed.

Alternatives 1 (No Action) and 5

Direct and Indirect Effects

Implementation of either of these no harvest alternatives would result in no direct effects to forage condition in the project area. Existing, post-fire development of forage habitats would occur and continue as described in the affected environment section of this discussion.

Alternatives 2, 3, and 4

Direct and Indirect Effects

Alternatives 2, 3, and 4 would not have measurable direct or indirect effects to forage habitat for big game. While harvest operations could potentially result in ground disturbances, the degree of disturbance would be so small that changes to forage availability would be immeasurable.

There would be no effects based on expected tree mortality. Forage use is expected to increase in areas where road closures would occur due to the elimination of disturbance by vehicle traffic, therefore making existing foraging areas more available.

Habitat Effectiveness Index (HEI)

Affected Environment

The Forest Plan identifies a model that calculates a Habitat Effectiveness Index (HEI), used to assess habitat quality and effectiveness, as well as display effects of activities that affect habitat features such as cover, road densities, forage, and the relationship of these different features. Both subwatersheds are meeting Forest Plan standards for HEI and HEI variables for summer range (Table W-14). For winter range, the Upper Little Malheur River subwatershed is meeting the Forest Plan standard for HEI, and habitat effectiveness factors for cover (HE_C), and size and spacing of cover (HE_S) (Table W-14). However, the Upper

Little Malheur River subwatershed is not meeting the Forest Plan standard for the habitat effectiveness factor for roads (HE_R) in winter range (Table W-14).

Table W-14. HEI Final and Variables. Winter range is not present in the Swamp Creek subwatershed.

| Habitat Effectiveness Index (HEI) Factor | Forest Plan Standards | Swamp Creek Subwatershed | Upper Little Malheur River Subwatershed |
|--|-------------------------|--------------------------|---|
| Habitat Effectiveness Index (HEI) | Summer Range ≥ 0.4 | 0.67 | 0.50 |
| | Winter Range ≥ 0.5 | --- | 0.55 |
| Habitat Effectiveness Cover (HE_c) | Summer Range ≥ 0.3 | 0.89 | 0.69 |
| | Winter Range ≥ 0.4 | --- | 0.94 |
| Habitat Effectiveness Size and Spacing of Cover (HE_s) | Summer Range ≥ 0.3 | 0.67 | 0.39 |
| | Winter Range ≥ 0.3 | --- | 0.46 |
| Habitat Effectiveness Roads (HE_r) | Summer Range ≥ 0.4 | 0.50 | 0.47 |
| | Winter Range ≥ 0.5 | --- | 0.38 |

All Alternatives

Direct and Indirect Effects

The changes to the existing HEI values by alternative are relatively small because the project area is a small fraction of the two subwatersheds. As a result, changes in HEI values generated by the model are too small to result in a change in the HE variables.

Implementation of any of the action alternatives would maintain the current HEI and the other HE variables.

Cumulative Effects

All activities listed in the beginning of Chapter 3 have been considered for their cumulative effects on big game cover habitat. The following discussion focuses on the past, ongoing and reasonable foreseeable future activities that may contribute positive or adverse effects to big game habitat.

Alternative 1

The existing condition of big game habitat would be maintained. Disturbance from vehicle traffic in areas where cover was reduced by the 2002 fire would continue. Return of cover to a satisfactory condition in severely burned areas would be delayed thus prolonging the disturbance from vehicle traffic.

The conifer planting proposed within the Wallowa-Whitman National Forest portion of the fire would re-establish cover in the long term in the adjacent subwatershed. Planting would accelerate recovery of vegetation and development of hiding and thermal cover.

Livestock grazing would be delayed for at least two years post-burn to allow for recovery of ground cover (Post-fire grazing guidelines - Appendix G). When livestock grazing is re-

initiated, grazing would be managed to meet Forest Plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wild and domestic ungulate use.

Alternatives 2, 3, and 4

Alternatives 2, 3, and 4 would provide benefits to big game by closing roads and therefore would reduce potential big game disturbance from vehicle traffic and improve big game distribution in the project area. Additional road closures on the Wallowa-Whitman N.F. portion of the fire area would reduce disturbance of big game by vehicle traffic further.

The conifer planting proposed within the Wallowa-Whitman National Forest portion of the fire would re-establish cover in the long term in the adjacent subwatershed. Planting would accelerate recovery of vegetation and development of hiding and thermal cover.

Livestock grazing would be delayed for at least two years post-burn to allow for recovery of ground cover (Post-fire grazing guidelines - Appendix H). When livestock grazing is re-initiated, grazing would be managed to meet Forest Plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wild and domestic ungulate use.

Alternative 5

Alternative 5 would further reduce potential disturbance of big game compared to Alternatives 2, 3, and 4 by closing more roads and therefore would reduce potential big game disturbance from vehicle traffic and improve big game distribution in the project area. Additional road closures on the Wallowa-Whitman N.F. portion of the fire would reduce disturbance of big game by vehicle traffic further.

The conifer planting proposed within the Wallowa-Whitman National Forest portion of the fire would re-establish cover in the long term in the adjacent subwatershed. Planting would accelerate recovery of vegetation and development of hiding and thermal cover.

Livestock grazing would be delayed for at least two years post-burn to allow for recovery of ground cover (Post-fire grazing guidelines - Appendix H). When livestock grazing is re-initiated, grazing would be managed to meet Forest Plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wild and domestic ungulate use.

Summary – Rocky Mountain Elk

Primary issues surrounding activities proposed and different elk habitat features focuses on effects to changes in road densities between the alternatives. Alternatives 2, 3, 4, and 5 reduce open road densities the most in the Upper Little Malheur River subwatershed effects from vehicle on big game. The Upper Little Malheur River subwatershed is currently meeting the Forest Plan standard for summer range, but is above the standard for winter range. These conditions would persist under all the action alternatives. Alternatives 2, 3, and 4 reduce open road density from 2.5 to 1.8 miles per square mile in summer range. Alternative 5 reduces road densities in summer range to 1.7 miles per square mile. Incremental reductions in road densities winter range are proposed for Alternatives 2, 3, 4, and 5.

Road densities would be slightly reduced in the Swamp Creek subwatershed under Alternative 5. The Swamp Creek subwatershed is currently meeting the Forest Plan standard

for summer range. Alternative 5 reduces open road density from 2.3 to 2.2 miles per square mile.

Pine Marten

The Forest Plan identified the pine marten as an MIS for old-growth habitat. Pine marten are generally associated with dense mixed conifer habitats with abundant down logs and snags that meet denning and foraging needs.

Affected Environment

Before the 2002 fire, the majority of pine marten habitat in the fire area was located within the Monument Rock Wilderness, which was dramatically affected by the Monument Fire. In those areas that burned at a high moderate to severe fire severity, pine marten habitat will not be present through the long term.

Where areas burned at light fire severity, development of pine marten habitat will take less time. These areas currently demonstrate a stem exclusion closed canopy (SECC) stand structure, about 108 acres total in the fire area, with dense down log habitats and high canopy closures.

Following the fire about 852 acres habitat for pine marten exists in mature and old growth forest (YFMS and OFMS stand types) in the fire area. In general, these stands are mixed conifer or ponderosa pine-dominated mature stands with multi-strata canopy structures. Fire effects and mortality have simplified the structure of these stands. Often, the lowest canopy layers suffered the largest mortality levels. Deadwood habitats vary by stand and effects of the fire. In some stands, much of the pre-existing down log material was consumed, as well as some of the soft snags. Generally, additional snags were created by the fire. These environments demonstrate a stem exclusion closed canopy (SECC) stand structure with dense down log habitats and high canopy closures.

About 222 acres of pine marten habitat is present in the fire area in the Swamp Creek subwatershed. Overall, about 8,451 acres of pine marten habitat is present in the Swamp Creek subwatershed; 25,585 total acres in size. Pine marten habitat on the west end of the fire is generally connected to unburned habitat in the Swamp Creek subwatershed.

About 630 acres of pine marten habitat is present in the fire area in the Upper Little Malheur River subwatershed. Overall, about 5,991 acres of pine marten habitat is present in the Upper Little Malheur River subwatershed; 31,474 total acres in size. Pine marten habitat is isolated and lacks connections to suitable habitat outside the fire in the Upper Little Malheur River subwatershed.

There is little information available for pine marten populations in the project area. Remote sensing cameras were set up to survey for pine marten during the Awake timber sale analysis. In 1994, two cameras were placed along FSR 1672457 but pine marten were not detected. Pine marten may exist in the project area, even though the two camera stations did not detect one at the time of the survey.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, indirect, or cumulative effects were addressed.

Alternatives 1(No Action) and 5

Direct and Indirect Effects

No effects would result from implementation of these alternatives. No harvest activities, removal of potential occupied habitat, or other direct effects would occur in the available 852 acres of mature and old growth forested habitat or the 108 acres of stands with SECC structure within the fire area. All existing snags and future large down logs in these stands would be available to provide habitat features for pine marten.

No planting is proposed in Alternative 1. Alternative 5 proposes to plant in the severely burned areas and would develop old growth habitat sooner than in Alternative 1. With planting or natural regeneration with an available seed source, it is estimated desired forested habitat conditions will become available beginning in 120 to 160 years with stands averaging 21"dbh or greater. This would result in a gap in available habitat. To further develop into Old Growth - YFMS or OFMS; suitable habitat could take an addition 50 to 100 years; without planting it can take decades more.

In the light and low-moderately burned areas, natural declines in canopy closure, structure complexity, or loss of deadwood habitats would be replaced within the mid to long-term periods through natural regeneration and snag recruitment. It is expected in the mid-term that snags will fall and provide quality habitat in areas.

Cumulative Effects

All of the activities identified as past, ongoing, or foreseeable have been considered for their cumulative effects on pine marten. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute positive or negative effects to the species or its habitat.

There will be an improved quality of pine marten habitat in the long term because of the additional conifer planting that has and is ongoing in old regeneration harvested areas and proposed planting within the Wallowa-Whitman portion of the fire. Firewood cutting, which includes snag removal, that has occurred and will continue, could decrease the quality of denning and foraging habitat.

Alternatives 2, 3, and 4

Direct and Indirect Effects - Salvage Harvest Actions

Alternatives 2, 3, and 4 proposed different levels of salvage harvest in severely burned areas. Alternative 2 would affect about 172 acres of mature and old growth forested habitat for pine marten in the fire area; roughly 20% of the total existing habitat in the fire area and two percent in the Swamp Creek subwatershed and less than 1 percent in the Upper Little Malheur River subwatershed. Alternative 3 would affect about 54 acres in the fire area; roughly 6 percent of the existing total habitat in the fire area and 1 percent in the Swamp Creek subwatershed and less than 1 percent in the Upper Little Malheur River subwatershed. Alternative 4 would affect 157 acres in the fire area; roughly 18 percent of total existing habitat in the fire area and 2 percent in the Swamp Creek subwatershed and less than 1 percent in the Upper Little Malheur River subwatershed. Salvage activities on about 7 acres will also occur in the commercial thinning areas under Alternatives 2 and 4. Salvage activities would result in short and mid-term effects to pine marten habitat by removing snags that could have been used for foraging and resting habitat by pine marten.

Alternative 3 would likely provide more habitat for pine marten in the long term compared to Alternatives 2 and 4. Fewer acres would be salvaged and more snags would be left in

salvage units compared to the Alternatives 2 and 4. Alternative 3 would retain 13 snags per acre (distribution of size classes are described in Chapter 2 of FEIS), scattered in clumps across all harvest units. Down logs would be provided to meet Forest Plan requirements during harvest activities and would provide habitat requirements into the future. Alternative 2 would provide 2.4 large snags (>21" dbh) per acre and has the highest number acres of salvaged of the three alternatives.

Alternative 4 retains the fewest potential future down log habitats within the proposed salvage units, maintaining down logs during harvest activities to meet Forest Plan standards. However, about 338 acres in large blocks would not be salvaged under Alternative 4 that are proposed for salvaged under Alternative 2. These snag patches would remain intact and may provide some areas of denning habitat. Alternative 4 also proposes fewer acres of salvage compared to Alternative 2.

Under Alternative 2 there would be 601 acres salvaged in RHCAs. These areas would not be salvaged under Alternatives 3 and 4. In the long-term, these areas would provide down logs for denning habitat as conifer forest conditions regenerate to suitable conditions under Alternatives 3 and 4.

Effects to pine marten from these salvage harvest activities would also occur in the long term in areas outside of current habitat. Once conifer stands regenerate to suitable structures and canopy densities, habitat for pine marten would develop. With planting or natural regeneration with an available seed source, it is estimated desired forested habitat conditions will become available beginning in 120 to 160 years with stands averaging 21" dbh or greater. This would result in a gap in available habitat. To further develop into Old Growth - YFMS or OFMS; suitable habitat could take an addition 50 to 100 years.

Direct and Indirect Effects - Commercial Thinning

Actions associated with thinning activities (pre-commercial and commercial) in the thinning areas proposed under Alternatives 2 and 4 have potential for direct and short to mid-term indirect effects to pine marten habitat. Alternatives 2 and 4 propose thinning 7 acres in current habitat; roughly 1% of current habitat in the fire area and less than 1% of current habitat in the Swamp Creek and Upper Little Malheur River subwatersheds. Alternatives 2 and 4 propose thinning actions to enhance resiliency and manage for a more appropriate structure condition. Thinning in resiliency treatment areas is not proposed under Alternative 3.

Direct and indirect effects of Alternatives 2 and 4 include disturbances associated with thinning activities as well as immediate changes to habitat associated with those activities. Thinning in these stands would make these areas less suitable for pine marten by reducing densities of the middle and understories.

Cumulative Effects

All activities identified as past, ongoing, or foreseeable activities have been considered for their cumulative effects on pine marten. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute positive or negative effects to the species or its habitat.

There will be an improved quality of pine marten habitat in the long term because of the additional conifer planting that has and is ongoing in old regeneration harvested areas and proposed planting within the Wallowa-Whitman portion of the fire.

Available pine marten habitat will be further reduced in the future by the salvage planned on the Wallowa-Whitman portion of the fire and firewood cutting. Firewood cutting, which includes snag removal, that has occurred and will continue, could decrease the quality of foraging and denning habitat. The proposed road closures will limit this impact due to impact since access is restricted.

Summary– Pine Marten

Salvage activities proposed under Alternatives 2, 3, and 4 would affect 20%, 6%, and 18%, respectively, of existing pine marten habitat in the fire area. Salvage activities proposed under these alternatives would affect less than 1% of existing habitat for pine marten in the Swamp Creek and the Upper Little Malheur River subwatersheds.

Salvage actions proposed in severe fire severity habitats outside of current habitat for pine marten would only result in long-term effects. Until forested vegetation has re-grown and matured such that cover and foraging conditions are again present, these burned areas will not provide suitable habitat. Once forested vegetation returns to a suitable habitat condition, effects of salvage proposals contained in Alternatives 2, 3, and 4 would result from the amount of down logs available as habitat features.

Thinning activities proposed under Alternative 2 and 4 in resiliency treatment areas would alter structure complexity and canopy closure in the forested canopy. These areas would be less suitable for the pine marten because of these activities. Thinning activities proposed under these alternatives would affect less than 1% of existing habitat for pine marten in the Swamp Creek and the Upper Little Malheur River subwatersheds.

Implementation of Alternative 1 or 5 would not have measurable direct or indirect effects to the species. Cumulative effects from additional salvage harvest on the Wallowa-Whitman portion of the fire. All existing and future snag and down log habitat would remain under Alternatives 1 and 5 in units identified for harvest in Alternatives 2, 3, and 4.

Affected Environment and Environmental Effects - Endangered, Threatened, and Sensitive Species

Forest Service regulations direct the identification of sensitive species by the Regional Forester (FSM, 2670). Species identified are those whose population viabilities are of concern. Forest Service Manual Direction (FSM 2670.32(4)) states that measures be taken to ensure federal activities do not contribute to the loss of viability or a trend towards Federal listing of species identified on the Regional Forester's sensitive species list.

Ten species on the Regional Forester's sensitive species list are documented or suspected to exist on the Malheur National Forest. Of the ten species, three have potential habitat or are suspected to be present in or adjacent to the project area: the gray flycatcher (potential habitat), the California wolverine (suspected), and the Pacific fisher (suspected).

These effects on each of these species are fully addressed in the Biological Evaluation accompanying this FEIS, Appendix D. The following analyses the affected environment, environmental effects, and determination for these species. Please consult that document for further information and detailed analysis of effects.

Gray wolf (*Threatened*)***Affected Environment***

The gray wolf historically occupied habitats within the state of Oregon and likely inhabited the Malheur National Forest (Wisdom et al. 2000). Currently, the State of Oregon considers gray wolves extirpated from the state. Suitable habitat exists in Oregon. Primary limiting factors include availability of secluded sites for denning, protection from disturbances and mortalities associated with man, and the availability and abundance of large ungulates as a primary prey source.

In 1999, a collared gray wolf (B-45) was discovered on the Malheur National Forest by monitoring crews working with experimental, non-essential wolf populations located in Idaho. The individual (a younger female) remained on the forest until it was removed later that spring by USFWS and ODFW officials and returned to the population area in Idaho. Two additional wolves have occupied habitat in the Blue Mountains since that time. It is anticipated that population expansion in Idaho will result in continued dispersal of individual wolves into northeastern Oregon.

The gray wolf was recently down-listed to Threatened in the winter of 2003.

Environmental Effects***Direct, Indirect and Cumulative Effects***

Limiting factors for wolves involve availability of prey (primarily large ungulates) and adverse interactions with humans. Generally, habitat management actions are compatible with wolf presence, particularly those that enhance prey availability. Human interactions are a concern, particularly around denning and rendezvous sites. Potential habitat exists within the project area, however, it is considered unoccupied. Activities proposed would not preclude future wolf occupation of this habitat. Wild ungulate populations would be maintained and potentially enhanced with effects of fire and the other actions that may benefit wild ungulates. Road closures proposed would reduce potential wolf-human conflicts in portions of the project area. Adjacency to the Monument Rock wilderness enhances habitat suitability through the availability of remote, roadless areas that would further reduce potential for wolf-human interactions that may be detrimental.

Following a review of the activities listed in the Past, Ongoing and Foreseeable Activities list for the Monument Project there will be no direct, indirect or cumulative effects anticipated with any of the alternatives proposed.

Determination

A *No Effect* determination is reached for activities proposed in the FEIS. Activities would have no effect upon the gray wolf for the following reasons:

- No populations currently occupy the Malheur National Forest;
- No denning or rendezvous sites are identified on the Malheur National Forest;
- Prey availability is considered abundant and not a limiting factor for presence or habitat occupation and would not be reduced by the activities proposed.

Canada Lynx (*Threatened*)***Affected Environment***

Vegetation meeting the definition of lynx habitat is characterized by higher elevation mixed conifer forests that contain key elements that promote and maintain high populations of their

primary prey source, the snowshoe hare. Early seral lodgepole pine habitats provide the primary habitat for the snowshoe hare, and thus the lynx, during winter months (Ruggerio et al., 1999; Ruediger et al., 2000). Riparian and other hardwood producing habitats make up much of their summer habitat. In addition to quality foraging areas, isolated denning sites, which contain an abundance of down wood or other denning site substrate is also important (Ruggerio et al., 1999; Ruediger et al., 2000). Jack-strawed lodgepole pine and/or abundant large wood habitats provide excellent denning sites and protection from potential predators. Relatively dense canopy closures are also favored habitat components in denning areas (Ruggerio et al., 1999). Lynx territories can be relatively large and individuals will travel extensively in search of food or mating interactions (Ruediger et al., 2000).

The Forest participated in the national lynx surveys from 1999 through 2001. No lynx were documented on the Forest during the survey. Areas surveyed included within and adjacent to the Monument Rock Wilderness. Unconfirmed lynx sightings have been reported on and adjacent to the Malheur National Forest. The nearest documented sighting to the project area occurred in October of 1992 when a lynx was reported just south of the project area along Anderson Creek. Following this sighting a lynx was trapped near Drewsey in January of 1993. These individuals are likely to have been dispersing from reproducing populations in Washington or Idaho. It is more likely that sightings on the district represent individuals traveling through the area rather than a reproducing population. Presence of lynx on the Malheur National Forest, and in or adjacent to the Monument Rock Wilderness, is suspected.

The Forest participated in the national lynx surveys from 1999 through 2001. No lynx were documented on the Forest during the survey. Areas surveyed included within and adjacent to the Monument Rock Wilderness. Unconfirmed lynx sightings have been reported on and adjacent to the Malheur National Forest. The nearest documented sighting to the project area occurred in October of 1992 when a lynx was reported just south of the project area along Anderson Creek. Following this sighting a lynx was trapped near Drewsey in January of 1993. These individuals are likely to have been dispersing from reproducing populations in Washington or Idaho. Presence of lynx on the Malheur National Forest, and in or adjacent to the Monument Rock Wilderness, is suspected.

Environmental Effects

Direct, Indirect and Cumulative Effects

There are no proposed activities under any of the action alternatives that would occur in stands with vegetation meeting the definition of lynx habitat. The closest suitable habitat is ¼ mile away from areas with proposed activities.

The activities proposed in each of the alternatives would not affect vegetation meeting the definition of lynx habitat, individual lynx, populations, or dispersal habitat that would limit lynx movements. Activities are south and east of potential dispersal corridors. Harvest will not decrease potential denning, foraging or dispersal habitat. Regrowth in some units will provide foraging habitat for snowshoe hares. Harvest activities will not affect this future habitat or prey for lynx. There would be no direct, indirect, or cumulative effects to the Canada lynx. Cumulatively, the actions as listed in the past, ongoing and foreseeable activities list for the Monument Project were considered and would not alter vegetation meeting the definition of lynx habitat. Harvest on the Wallowa-Whitman Forest within the Monument Fire area will not reduce total suitable habitat for lynx. Most of the habitat within the W-W portion was considered unsuitable/non-habitat before the fire (Wallowa-Whitman

DEIS, 2003). Road closures, both on the Prairie City RD and the Wallowa-Whitman N.F. portion of the fire area would reduce potential disturbance from vehicle traffic.

Determination

A *No Effect* determination is reached for the activities proposed in the FEIS. The activities would have no effect upon the Canada lynx for the following reasons:

- Activities proposed do not occur within vegetation meeting the definition of lynx habitat
- Activities proposed would not adversely affect potential dispersal habitats or corridors that would allow individual movements and dispersal between vegetation meeting the definition of habitat.

Sage Grouse (Sensitive)

Affected Environment

The western sage grouse inhabits the sagebrush steppe habitat of the Interior Columbia Basin and Great Basin regions. All aspects of the species ecology, including breeding and nesting habitat, forage, and winter range/migration habitat are closely tied to sagebrush habitats. The species is documented on the Prairie City Ranger District. Limited sagebrush habitat exists within the project area, primarily near the Little Malheur River. Habitat is marginal at best, as the individual patches are small and intermixed with ponderosa pine and juniper stringers and patches. The species has not been sighted in the project area.

Environmental Effects

Direct, Indirect, and Cumulative Effects

Habitat for this species may occur within the project area, though it is likely poorer quality habitat due to the small size of patches of desirable habitat in the project area. Activities proposed will not occur within suitable habitats for the species. The list of activities in the past, ongoing, and foreseeable activities list for the Monument Project will not alter sage grouse habitat. There would be no direct, indirect or cumulative effects from actions proposed in the alternatives due to lack of occurrence of activities in suitable habitat. Following a review of the activities listed in the past, ongoing, and foreseeable activities list for the Monument Project there will be no direct, indirect or cumulative effects anticipated with any of the alternatives proposed.

Determination

A *No Impact* determination has been reached for this species based upon the lack of activities occurring within any suitable habitat in the project area for any of the alternatives proposed.

Gray Flycatcher (Sensitive)

Affected Environment

Habitat for this species likely exists within the project area, particularly in the lower elevation woodlands and juniper habitats on the south end of the project area near the Little Malheur River. There are about 52 acres of juniper woodlands in the project area that could be considered potential habitat.

Environmental Effects

Direct, Indirect, and Cumulative Effects

No harvest activities would occur in Alternatives 1 and 5. As such, there would not be any direct, indirect, or cumulative effect from the activities proposed in any of the alternatives.

An estimate of less than 10 acres is within units in the harvest Alternatives, 2, 3, and 4. Juniper would not be cut in the units; therefore nesting trees would continue to exist after harvest. Due to the small amount of potential habitat, the few acres included in harvest units, and no cutting of juniper, there would be little impact if gray flycatchers exist in the area. If gray flycatchers do exist in units where there is potential habitat, individuals or pairs could be disturbed by harvest activities. There would not be the level of disturbance to enough habitat that would affect a population or gray flycatchers as a species. Following a review of the activities listed in the past, ongoing and foreseeable activities list for the Monument Project there will be no cumulative effects anticipated with any of the alternatives proposed.

Determination

A *No Impact* determination is reached for Alternatives 1 and 5 because no harvest activities or disturbance would occur.

For Alternatives 2, 3, and 4, activities *may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population.*

California Wolverine (Sensitive)

Affected Environment

California wolverine has been confirmed on the forest in the Strawberry Mountain Wilderness, where a carcass of a juvenile was found in 1992. Sightings since then indicate continued presence. Habitat for the species is expected in the Monument Rock Wilderness, based on sighting reports. In the project area, forested areas are likely dispersal habitat for individuals. However, year-round use of habitat in the project area is possible, given the sizes of home ranges for individuals if they do occur within the Monument Rock Wilderness. The Monument Fire in 2002 and the previous Monument Rock Fire in 1994 affected most of the potential habitat.

Environmental Effects

Direct, Indirect, and Cumulative Effects

There would be no direct or indirect effects for Alternative 1, the No Action Alternative, or for Alternative 5. Alternative 5, which has no harvest and reduces road density more than the other action alternatives (2, 3, or 4), is not expected to have an impact on wolverine. The road closures are in areas that would not provide habitat for wolverine. Duration of the closures would be short, probably several days to construct gates or earth berms, and intensity would be low, probably one piece of machinery working on one road closure at a time.

The activities proposed in action Alternatives 2, 3, and 4 would not adversely affect habitat condition and potential such that habitat would preclude use by the species. Primary activities of concern would involve commercial thinning proposed in Alternatives 2 and 4, where green tree treatments would reduce canopy closures and simplify stand structures with the treatments. These activities could lead to direct effects of habitat modification. However, due to the location of these areas that would be treated under Alternatives 2 and 4, level of effect would be minor and would not likely exclude use of those habitats by individuals that may occupy the area. The level of effects is not expected to be significant.

The activities proposed in any of the five action alternatives are not likely to significantly contribute to the cumulative effects of other past, present and reasonably foreseeable federal actions. Activities would not significantly affect habitat availability or use over the larger

geographic area, over any significant period. Road closures, both on the Prairie City RD and the Wallowa-Whitman N.F. portion of the fire area would reduce potential disturbance from vehicle traffic. Planting under Alternatives 2, 3, and 4 on the Prairie City portion of the fire and proposed planting on the Wallowa-Whitman N.F. portion of the fire area would shorten the period for reestablishment of forested cover. These alternatives would also not contribute to a negative trend in suitable habitat availability or the presence of the species across the District, Forest, or Region. Following a review of the activities listed in the past, ongoing and foreseeable activities list for the Monument Project, there will be no cumulative effects anticipated with any of the alternatives proposed.

Determination

A *No Impact* determination is reached for the No Action Alternative and alternative 5. The No Action Alternative would have no activities and Alternative 5 road closures would be short duration and low intensity.

Actions proposed in Alternatives 2, 3, and 4 *may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population*. Short-term disturbance related effects associated with harvest activities could result; however, they are short-term effects that would not affect long-term habitat use. Likewise, changes to vegetative structure conditions in alternatives two and four may result in limited short term effects, however, because they are not primary habitat types nor located in areas considered high quality habitat areas based upon elevation and location, the level of that affect is expected to be minor and immeasurable. Viability would not be affected, as suitable habitat would not be modified or changed, and prey sources would not be reduced.

Pacific Fisher (Sensitive)

Affected Environment

Habitat may occur within the project area. Affects of the fire on conifer habitat likely reduced the quality of habitat in the project area. Areas where the fire severity was light may provide suitable habitat, though with the fire and past harvest activities, fragmentation maybe an issue with the suitability of that habitat.

One unconfirmed sighting in 1996 was located about 21 miles west and south of the project area. Two remote cameras were set up in the project area for pine marten surveys in 1994 for the Awake Timber Sale. No fisher were recorded during that survey and no sightings have been reported in the area.

Environmental Effects

Direct, Indirect, and Cumulative Effects

The activities proposed in Alternatives 2, 3, and 4 could result in cumulative effects to fisher habitat in the project area. Incremental modification of existing habitat would occur with the proposed activities, particularly in Alternatives 2 and 4, where green tree treatments would occur. This would be additive to other federal actions, primarily past timber harvest actions and other conifer treatments, that have reduced habitat quality across the project area and larger analysis area.

On a spatial scale, the level of effect of this action cumulatively is low. About 1% of potential habitat in each subwatershed would be affected. In the Swamp Creek subwatershed, this would add incremental levels of effect to other activities that have affected habitat. The Upper Little Malheur River subwatershed would see a more significant

incremental effect, as more extensive timber harvest has occurred in much of the subwatershed, coupled with the habitat affected by the Monument Fire.

On a temporal scale, the effect would be expressed in the short to mid-term. Over time, without further management actions, natural regeneration, and succession would develop dense higher quality habitat on the acres treated by the activities proposed. However, planting activities proposed under Alternatives 2, 3, and 4 on the Prairie City portion of the fire and proposed planting on the Wallowa-Whitman N.F. portion of the fire area would shorten the period needed to develop dense forested stands favored by this species. Road closures, both on the Prairie City RD and the Wallowa-Whitman N.F. portion of the fire area would reduce potential disturbance from vehicle traffic.

Relative to trends, activities would continue a trend of habitat reduction, cumulative to past harvest management actions.

The level of effects would be tempered by the unlikely presence of this species in the project and analysis area. Lack of sighting data and other recorded presence information suggests that this species is unlikely to be present in the project area. Following a review of the activities listed in the past, ongoing and foreseeable activities list for the Monument Project there will be no cumulative effects anticipated with any of the alternatives proposed.

Determination

A *No Impact* determination is reached for the Alternative 1 and Alternative 5, as no harvest activities would occur.

The actions proposed in Alternatives 2, 3, and 4 *may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population*. Short-term disturbance related effects associated with harvest activities could result, however, they are short-term effects that would not affect long-term habitat use.

Likewise, changes to vegetative structure conditions in alternatives two and four may result in limited short term effects, however, because they are not primary habitat types nor located in areas considered high quality habitat areas based upon elevation and location, the level of that affect is expected to be minor and immeasurable. Viability would not be affected, as suitable habitat would not be modified or changed, and prey sources would not be reduced.

Affected Environment and Environmental Effects - Other Species of Concern

Northern Goshawk

Affected Environment

The northern goshawk is an accipiter inhabiting mixed conifer and ponderosa pine environments on the Malheur National Forest (Daw 1996). Nesting habitat is often defined by canopy structure and closure. Daw (1996) found a strong correlation between higher canopy closure of multi-strata mixed conifer and ponderosa pine stands, and occupied nesting habitat. Habitat features providing for a stable prey base are important for the northern goshawk. Prey includes, but is not limited to, snowshoe hares, golden-mantled ground squirrels, pileated woodpeckers, northern flickers, and gray jays. Environments providing for these species usually result in suitable foraging habitat for goshawks.

Approximately 852 acres of potential habitat remain within the fire area. This habitat consists of mature and old growth habitat (YFMS and OFMS stand structures). Patches of

potential habitat in the project area burned at light and low-moderate fire severities. Primary changes to habitat quality and condition consists of a reduction in canopy closure because of fire mortality. The majority of stands affected had relatively low canopy closures (about 35 to 50%) before the fire. Canopy closure estimates in these stands are likely in the 20 to 40% range now, based upon visual observations from field surveys. It is likely these habitats would continue to function as suitable foraging habitat for northern goshawks. Canopy closure in these stands will likely decrease in the future because of secondary fire effects.

Patch size and distribution of goshawk habitat has been reduced by the Monument Fire and past timber harvest activities. Individual patch sizes currently range from less than 50 acres to a little over 250 acres. These patches are generally located along edges of the fire, in close proximity to, or directly connected to suitable habitat outside the fire area.

There are four recorded goshawk nests adjacent to the fire area, two are about ¼ mile from the southern boundary, one is between ½ mile and 1 mile from the eastern boundary, and one is between ½ mile and 1 mile from the northwest edge of the project perimeter. One of the nests at the southern end of the project area is along a major road. Before the fire, there were no recorded goshawk nests in the fire area. After the fire, there was a goshawk sighting within the project area.

A goshawk survey was done for a previous project, the Awake timber sale, in 1994. One of the nests at the southern end of this project was documented during this survey. Goshawk responses were not recorded during the survey. Just outside the fire perimeter, about 85 acres of the original territory remains old growth; this area currently provides suitable nesting habitat. It is uncertain whether goshawks will reoccupy these nests adjacent the fire. There has been a reduction in the quality of the nesting habitat but the habitat still does provide good foraging habitat.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, indirect, or cumulative effects were addressed.

Alternatives 1 and 5

Direct and Indirect Effects

Implementation of Alternative 1 or 5 would have no direct or indirect effects associated with changes to occupied habitat and features that influence habitat suitability. The difference between these two alternatives is that planting would occur in Alternative 5 in the severely burned areas and would develop habitat sooner. With planting or natural regeneration with an available seed source, it is estimated desired forested habitat conditions will become available beginning in 120 to 160 years with stands averaging 21" dbh or greater. This would result in a gap in available habitat. To further develop into Old Growth - YFMS or OFMS; suitable habitat could take an addition 50 to 100 years.

Alternatives 2 and 4

Direct and Indirect Effects

There would few differences in the reduction of current habitat (OFMS and YFMS) between Alternatives 2 and 4. In Alternative 2, activities would remove habitat used by woodpecker prey on about 180 acres (salvage and commercial thinning treatments removing snags). Alternative 4 activities would remove habitat used by goshawk prey on about 163 acres (salvage and commercial thinning). Down logs and patches of understory trees would likely still provide foraging habitat for rodent prey. Severely burned areas are not considered

suitable habitat for goshawks. However, they may forage in burned areas adjacent to suitable habitat.

One difference between these alternatives is that Alternative 2 would provide snags in a more even distribution across the planning area while Alternative 4 would concentrate snags in blocks. Nesting habitat would remain the most limiting factor. Planting would restore nesting habitat sooner than Alternative 1, and generally the same as described for Alternative 5 except more acres are planned for planting.. However, it should be noted that nesting activity on the Malheur National Forest has been documented in much lower quality habitat (Daws 1996). These habitats would likely continue to provide foraging for a goshawk, providing habitat for rodent prey as well as some landbird prey species.

Commercial thinning of green trees in the resiliency treatment areas would occur on only 7 acres and therefore is not expected to have an effect on nesting habitat. In commercial thinning treatment areas 1.5 to 2.5 snags per acre would be left following salvage activities within Alternative 4 and 2.4 for Alternative 2, which may help provide habitat for goshawk prey.

There would be no direct disturbance to nesting goshawks during implementation. If any of the recorded nests are active or new nest sites are identified within or immediately adjacent to the project area, management activities would be restricted within ½ mile of the nest sites from April 1 to September 30 to avoid disturbing goshawks during the breeding season.

There would be no direct or indirect effects to goshawk or their habitat from other activities proposed under Alternatives 2 and 4.

Alternative 3

Direct and Indirect Effects

Alternative 3 leaves the highest number of snags in the harvest units compared to Alternatives 2 and 4. The snag strategy of leaving 13 snags per acre in salvage harvest units would provide more abundant foraging habitat for goshawks compared to Alternatives 2 and 4. Salvage harvest would occur on 54 acres of habitat. There would be more foraging habitat available because more structure (snags and future down logs) would be left in the salvage units for goshawk prey species. Planting would restore nesting habitat sooner than Alternative 1, and generally the same as described for Alternative 5 except more acres are planned for planting.

There would be no direct disturbance to nesting goshawks during implementation. If any of the recorded nests are active or new nest sites are identified within or immediately adjacent to the project area, management activities would be restricted within ½ mile of the nest sites from April 1 to September 30 to avoid disturbing goshawks during the breeding season.

There would be no direct or indirect effects to goshawk or their habitat from other activities proposed under Alternative 3.

Cumulative Effects - All Alternatives

All of the past, ongoing and foreseeable activities identified in the beginning of Chapter 3 have been considered for their cumulative effects on northern goshawk. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute positive or negative effects to the species or its habitat.

Nesting habitat is typically the limiting factor for goshawks. Past timber harvest reduced mature and old growth habitat preferred for nesting and fledging. Past timber harvest has

also reduced the amount of foraging habitat available. Since 1993, the Forest Plan as amended, has directed the Malheur National Forest to conduct timber sales in a manner that moves stands towards OFMS and OFSS structural stages, and timber sales planned since that time should not have contributed to loss of mature and old growth forest.

Additional planting activities are being planned for old regeneration harvested areas in the burn area and include conifer planting. This additional planting proposed in the Wallowa-Whitman portion of the fire would also improve foraging habitat in the long-term.

The cumulative effects from road use and general disturbance of goshawks can result from road use and ATV type vehicles. The planned closures within the Wallowa-Whitman portion of the fire would further reduce this disturbance.

There would not be cumulative effects to goshawk or their habitat on the Wallowa-Whitman NF from activities proposed under the alternatives. Wallowa-Whitman personnel surveyed their portion of the Monument Fire and found no nests or individual goshawks in June 2003 need (DEIS, Monument Fire Recovery Project-Whitman Unit- Wallowa Whitman NF, Chapter 3).

Summary

Alternative 1 and 5 would not result in changes to goshawk habitat through the mid-term. Alternative 1 would delay the reestablishment of forested areas because of the lack of planting. Plant would occur in the severely burned areas under Alternative 5.

Alternatives 2, 3, and 4 would result in reductions in foraging habitat because of salvage activities with the OFMS and YFMS forest structure stands. Alternative 3 would have the least affect to foraging habitat because it proposes the fewest acres of salvage activities and leaves the greatest number of snags. Nesting habitat would be slightly affected under Alternatives 2 and 4 because of commercial thinning activities on 7 acres in the commercial thinning areas. Overall, nesting habitat is still the most limiting factor due to effects of the fire itself and will be 150 or more years before mature structure is restored.

Landbirds including Neotropical Migrants

Landbird species relevant to the Monument Fire area include raptors, woodpeckers, neotropical migrants, and a host of other passerines that are year-round residents. Their habitat requirements are diverse and wide ranging. Nearly every habitat type from the highest and coldest alpine habitats, to hot and dry desert shrub steppe habitats of the Great Basin, are inhabited by species represented in these groups.

Affected Environment

Habitats for some species were greatly reduced due to high severity burns occurring throughout much of the fire area. Habitat for species that utilize fire affected habitats increased. Still other species will benefit over time from the disturbance as succession occurs over the fire area. Changes to population distributions, species diversity, and species distribution are also expected due to fire effects.

Activities proposed would affect six habitat types within the project area and are the focus of this analysis of effects to landbird species (Table W-12). Species are identified as indicators for the condition and quality of habitat for each of the structure/habitat types identified in that table. Forest, structure and habitat types, and focal species are from Altman (2000).

Table W-15. Forest and structure/habitat types and associated focal landbird species

| Forest Type | Structure/Habitat Type | Focal Species |
|---------------------|-----------------------------------|-------------------------|
| Dry Forest | Old Forest-Large Patches | White-Headed Woodpecker |
| Dry Forest | Grassy Openings-Dense Thickets | Flammulated Owl |
| Dry Forest | Open Understory-Regeneration | Chipping Sparrow |
| Dry Forest | Burned Old Forest | Lewis' Woodpecker |
| Mesic Mixed Conifer | Multi-Layered, Structural Diverse | Varied Thrush |
| Mesic Mixed Conifer | Fire Edges and Openings | Olive-Side Flycatcher |

Source: Altman 2000

The following analysis would look at these habitats and species, the existing condition of habitat in the project area, and the effects of activities proposed for each species.

Dry Forest: Old Forest-Large Patches – White Headed Woodpecker

This habitat type is described in the PCE section of this document. Please refer to that section for further discussion of effects.

Other species that utilize this forest and habitat type are: flammulated owl, Lewis' woodpecker, white-breasted and pygmy nuthatches, Williamson's sapsucker, northern goshawk, Hammond's flycatcher, hairy woodpecker, and brown creeper.

Dry Forest: Old Forest Grassy Openings-Dense Thickets – Flammulated Owl

The dry forest habitat type was present prior to the Monument Fire. In much of the fire, it was a rather abundant habitat condition. A significant portion of dry forest environment present was lost due to severe fire intensities in the Monument Rock wilderness. Much of the about 16,942 acres that burned at high-moderate to severe fire severity affected this habitat type. Along the edges of the fire, similar habitat was burned, however, at much lower fire severities. These lower fire severities often added to the diversity of openings created by fire and thickets of reproduction existing prior to the fire. The number of snags expected because of the fire will provide abundant nesting habitat and thickets of understory trees provides quality habitat for roosting and hiding from predators. Much of the about 672 acres in the project area now represent a mix of this habitat type and the dry forest-open understory/regeneration habitat condition. This acreage is based on field notes during walk-through exams and identifying areas where snags and pockets of dense understory thickets exist.

Other species that utilize this forest and habitat type are: great-gray owl, white-breasted and pygmy nuthatches, white-headed and hairy woodpecker, brown creeper, chipping sparrow, Townsend's solitaire, Hammond's flycatcher Cassin's finch, and western tanager.

Dry Forest: Open Understory-Regeneration – Chipping Sparrow

This forest type was developed in portions of the fire area that burned with light severity. On about 672 acres of the project area, light underburns opened up canopy conditions, particularly in lower canopy levels. This underburning created a more suitable, open understory condition for species utilizing these habitat types. The patchy mosaic effects of

fire in these stands also helped retain patches of regeneration important to this habitat condition.

Other species that utilize this forest and habitat type are: Townsend's solitaire, Cassin's finch, American robin, dark-eyed junco, and the dusky and gray flycatchers.

Dry Forest: Burned Old Forest – Lewis' Woodpecker

This dry forest habitat type is described in the PCE section of this document referring to the severe-fire effects on forested habitat. The Lewis' woodpecker, a focal species for this habitat condition, is addressed in that section. Please refer to it for further details and effects from proposed activities.

Other species that utilize this forest and habitat type are: olive-sided flycatcher, American kestrel, black-backed and three-toed woodpecker, mountain bluebird and northern flicker.

Mesic Mixed Conifer: Multi-Layered, Structurally Diverse – Varied Thrush

Mesic mixed conifer forest was another abundant habitat feature prior to the Monument Fire, particularly in the Monument Rock Wilderness. However, severe fire significantly reduced the availability of this habitat in the project and fire area. Small patches of this habitat condition remain in portions of the Swamp Creek and Little Malheur River subwatersheds. Outside the fire, particularly in the Swamp Creek subwatershed, this habitat type is still abundant, though fragmentation is an issue.

Other species that utilize this forest and habitat type are: golden-crowned kinglet, chestnut-backed chickadee, hermit thrush, Townsend's warbler, and winter wren.

Mesic Mixed Conifer: Fire Edges and Openings – Olive-Sided Flycatcher

This mesic mixed conifer condition has become relatively abundant due to effects from the Monument Fire. This condition is found most often along the edges of the fire and areas surrounding and including islands of unburned or low severity burned forested habitats within the fire. Habitat features include openings allowing for effective and efficient preying upon aerial insects, as well as the maintenance of live trees to provide nesting and perching habitat.

Other species that utilize this forest and habitat type are: western tanager, Cassin's finch, western wood-peewee, mountain bluebird, American kestrel, northern flicker, and American robin.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, indirect, or cumulative effects were addressed.

Alternatives 1 and 5

Direct and Indirect Effects

These alternatives would maintain existing fire-affected habitat conditions and the habitats they provide. The most abundant habitat types within the project and fire area would be habitat types affected by fire. Benefiting species, in addition to the primary cavity excavators previously described, would include mountain and western bluebirds, olive-sided flycatchers, and other fir-associated species. In areas of low fire severity, 2,847 acres of habitat for species dependent upon old dry forest in diverse structure conditions would continue to find suitable habitat. Those habitats may continue to fluctuate with secondary fire effects. Canopy closures and structure diversity may decrease due to secondary fire effects. As snags

are created naturally, conditions would benefit secondary cavity nesters such as pygmy nuthatch and flammulated owl. These conditions would reduce habitat for species such as the varied thrush and Townsend's warbler.

These alternatives lose the opportunity to promote stand structures and stand densities that are not only more resilient to secondary fire effects, but also future disturbances similar to what occurred with the Monument Fire. Indirect effects would include development of dry forest habitats into structure conditions desired by species such as the white-headed woodpecker. This is significant, particularly in relation to the drier pine forest types and the significant loss of such habitat that occurring in the Monument Fire.

Mesic mixed conifer, multi-layered forest, and edges adjacent to openings will remain as described in affected environment. Those areas will continue to provide habitat for species such as the varied thrush and olive-sided flycatcher.

The overall effects to landbird species would be similar to those described in the PCE section of the MIS discussions. In a sense, they represent the larger cohort of landbird species that inhabit those types of habitats described.

Cumulative Effects

All of the past, ongoing and foreseeable activities identified in the beginning of Chapter 3 have been considered for their cumulative effects on landbirds. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute positive or adverse effects to the species or its habitat.

Overall, there are no cumulative effects to landbird species associated with Alternative 1. Within the severely burned areas, Alternative 5 has additional conifer planting planned. This planting in addition to the past and ongoing planting of conifers will contribute to the development of forested bird habitat sooner than with alternative one. Overall, species such as American robin, white-breasted nuthatch, and chipping sparrow, to name a few will benefit in the very long term.

Alternative 2 and 4

Direct and Indirect Effects

Alternative 2 would result in the most change to existing habitat conditions for various landbird species using fire-affected habitats. Severe and light severity fire affected habitat types utilized by different landbird species would be impacted. Alternative 4 would result in fewer effects at a spatial scale, though impacts at the site-specific level would be similar.

Salvage harvest areas that burned at high-moderate to severe fire severities would reduce habitat quality for a variety of burned-forest dependent species (including those that select for burned old forest and fire edges and openings). Removal of snags would reduce nesting habitat opportunities and affect woodpecker occupation. Snags provide nesting holes for species such as the mountain and western bluebirds. Of the about 16,942 acres of this habitat type in the fire area, Alternative 2 would salvage about 3,477 acres (about 21%) and Alternative 4 would salvage about 2,601 acres (about 15%).

Commercial thinning activities would occur in pockets of forested areas on about 76 acres in commercial thinning areas (light to low-moderate fire severity areas); about 3% of the total light severity fire affected habitat type. Species such as varied thrush that select for denser, more complex multi-layered habitats would see reductions in habitats across the 223 acres.

Removal of the canopy commercial and precommercial thinning (about 392 acres) activities would benefit species that select for ponderosa pine forest with open understory, providing a higher potential of increasing shrubs and small trees, habitat for chipping sparrows.

Species like flammulated owls would be negatively affected by harvest of most of the snags in both commercial thinning and salvage units, thinning the green trees in the resiliency units, and precommercial thinning thickets on 392 acres. Harvest units would create more open large tree habitat conditions preferred by flammulated owl, pygmy nuthatch, and white-headed woodpeckers and at the same time remove many of the snags that would have been nesting habitat.

Planting would occur across much of the project area deemed suitable for planting activities and regeneration of forested habitat. Alternatives 2, 3, and 4 propose about 5,322 acres of planting within harvested and un-harvested areas. This would result in a shorter period of conifer habitat regeneration, when compared to the Alternative 1. Different successional stages would develop, providing habitat for different species over that time period

Cumulative Effects

All of the past, ongoing and foreseeable activities identified in the beginning of Chapter 3 have been considered for their cumulative effects on landbirds. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute positive or adverse effects to the species or its habitat. These cumulative effects are measured by treatment type and habitat involved.

Fragmentation resulting from timber harvesting can have several negative effects on landbirds such as insufficient patch size for area-dependent species, and increases in edges and adjacent hostile landscapes, which can result in reduced productivity through increased nest predation, nest parasitism, and reduced pairing success of males. Additionally, fragmentation has likely altered the dynamics of dispersal and immigration necessary for maintenance of some populations at a regional scale.

Salvage treatments would add cumulatively to changes having occurred in similar burned habitats. Salvage activities resulting from the Ironside Fire Recovery Project (1994) provide the primary source of additional cumulative effects. Through attrition over the past 9 years, much of the remaining snags have fallen. Primary habitat condition would be considered very early seral/grassland/upland shrubland (ceanothus shrubs the most common structure). Species such as mountain and western bluebirds, northern flickers, and other species dependent upon dead tree structure have likely seen habitat quality decline.

Commercial thinning proposed would also result in cumulative effects. Activities proposed would result in changes to canopy closures affecting some species that would utilize those habitats. This would be additive to other changes in the forested environment, primarily past timber harvest, that has reduced the level of suitable habitat available to the species. The removal of pockets of understory trees (about 223 acres), precommercial thinning (about 392 acres) along with past harvest treatments would open up the understory and benefit species like the flammulated owl and white-breasted nuthatch. By opening up the canopy for shrubs and understory to grow, species such as chipping sparrow and American robin will benefit. Also benefiting from the commercial thinning treatments cumulatively with past harvest activities are the western tanager, American robin, and olive-sided flycatcher that prefer fire edges and openings.

These effects, however, are somewhat countered by cumulative effects of fire suppression creating additional habitat in areas that did not historically exist. Fire suppression has allowed traditionally open stands to develop later seral stand and structure condition more conducive to species that select for diverse forest vegetation and canopy structure. Species that would benefit from the cumulative effects include the varied thrush, golden-crowned kinglet, and Townsend's warbler. These effects are expressed temporally through the period of time such habitats would be in an unsuitable condition for species affected. Likewise, on a spatial scale, these effects would be demonstrated in fragmentation and changes to habitat across the landscape.

In general, the conifer planting associated with Alternatives 2 and 4 will add cumulatively to past and ongoing conifer planting to improve the overall bird habitat. Forested environment will develop sooner than without additional planting.

Alternative 3

Direct and Indirect Effects

There would be direct and indirect effects to landbirds species based upon different habitat types affected. Effects differ in acres involved and types of treatments and resulting habitat manipulations expected to occur.

In salvage treatments, 2,467 acres would be affected; about 15% of the high-moderate to severe fire severity areas. However, snag retention standards would be higher, which would provide for better habitat conditions for several species, including the Lewis' woodpecker (see PCE discussions) and the western and mountain bluebirds. Other species dependent upon cavity habitats in burned forests would also see some benefits. Snag densities would average around 13 snags per acre, in size distributions identified in Chapter 2, and would also remain in all riparian areas. These would be scattered in clumps of 2 to 6 acres. These patches would provide primary habitat areas within the units. Habitat conditions would continue through the period that snags remain standing. Over the short to mid term, snag densities would decline as snags fall. Habitat quality would be reduced accordingly. Habitat quality would generally be considered unsuitable for snag dependent species within 30 years post fire due to a combination of snag fall and salvage harvest.

In the low fire severity areas no treatments to green trees would occur. All that would be removed are snags, maintaining 13 per acre as described in Chapter 2. Removal of snags may result in some direct effects to species utilizing individual snags. Indirect effects would be small, as sufficient snag habitat would be maintained. Fewer total acres of low severity habitat would be harvested for removal of dead trees. Structure conditions would remain, providing similar habitat condition as described in the Affected Environment section. Lack of thinning, including precommercial thinning, and no harvest of suitable habitat in units such as 3 and 12 would result in more habitat being provided for white-headed woodpeckers, flammulated owls, pygmy nuthatches, and other cavity dependent species.

Cumulative Effects

All of the past, ongoing and foreseeable activities identified in the beginning of Chapter 3 have been considered for their cumulative effects on landbirds. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute positive or adverse effects to the species or its habitat.

In salvage treatments, cumulative effects would be similar to Alternatives 2 and 4. Within retained patches, suitable habitat would remain. However, in harvested areas, snag densities

would be very low and result in similar cumulative effects but should have less adverse cumulative effects than Alternatives 2 and 4 because fewer snags will be harvested.

In low severity fire salvaged areas, cumulative effects are less significant, as no change to green vegetation would result. Existing stand structures would be maintained providing habitat condition similar to those described in the Affected Environment section. Effects that would occur involve dead tree removal and would be additive to effects of some past harvest actions and firewood cutting.

Temporal, scale and trend effects would be similar, particularly for high fire severity areas between Alternatives 2, 3, and 4. In the low fire severity areas, effects would be less similar and less significant due to lack of change in green-forested habitat.

Summary of Landbirds Including Neotropicals

Overall, effects to landbird species would be similar to those described in the PCE section of MIS discussions. In a sense, they represent the larger cohort of landbird species that inhabit those types of habitats described.

Alternatives 2 and 4 would result in the most significant changes to habitat condition for various land bird species due to the extent and prescriptions of activities proposed.

Alternative 3 would result in the lowest level of changes in habitat between Alternatives 2, 3, and 4. Alternatives 1 and 5 would maintain the existing condition of habitats.

Similar to discussions for PCE species, the effects of the activities proposed have less to do with viability of species and species diversity, particularly at the landscape level, and more about distribution across that landscape based upon habitat availability. Alternatives 2, 3, and 4 would result in changes to distribution across the project area, particularly in the high fire severity areas. The level of that change in distribution varies based upon snag retention standards within units as well as the retention of un-harvested habitat scattered across portions of the project area. Depending upon species, Alternatives 3 and 4 provide for the best distribution option for a diversity of species in the project area.

Birds of Conservation Concern

In February of 2003, The US Fish and Wildlife Service (USFWS) released the document *Birds of Conservation Concern 2002* through the Federal Register (USFWS 2002). This document identified bird species of conservation concern across North America by geographic region. The project area exists within the Northern Rockies region, Bird Conservation Region (BCR) 10. Several species on that list are known or suspected to occur within the project area, including the flammulated owl, pygmy nuthatch, Lewis' and white-headed woodpeckers, and the Williamson's and red-naped sapsuckers. These species are addressed through the MIS PCE and the above landbird discussions and/or the Wildlife Specialist Report.

Table W-16 identifies the list of species for BCR 10 that includes the project area. This table identifies the species listed and presence or absence within the project area. The third column documents reason for absence as appropriate.

Table W-16. List of species of BCR 10, Northern Rockies Region, Their status as present or absent from the Project Area, and reasons for absence.

| Species | Presence /Absence | Reason for Absence/Where Addressed If Present |
|-------------------------|-------------------|---|
| Swainson's Hawk | Absent | No Suitable Habitat |
| Ferruginous Hawk | Absent | No Suitable Habitat |
| Golden Eagle | Present | Habitat Not Affected by Proposed Activities |
| Peregrine Falcon | Absent | No Suitable Habitat |
| Prairie Falcon | | Habitat Not Affected by Proposed Activities |
| Yellow Rail | Absent | No Suitable Habitat |
| American Golden-Plover | Absent | Outside Range |
| Snowy Plover | Absent | No Suitable Habitat |
| Mountain Plover | Absent | Outside Range |
| Solitary Sandpiper | Absent | Outside Range |
| Upland Sandpiper | Absent | No Suitable Habitat |
| Whimbrel | Absent | Outside Range |
| Long-Billed Curlew | Absent | No Suitable Habitat |
| Marbled Godwit | Absent | Outside Range |
| Sanderling | Absent | Outside Range |
| Wilson's Phalarope | Absent | No Suitable Habitat |
| Yellow-Billed Cuckoo | Absent | Outside Range |
| Flammulated Owl | Present | Landbird Discussion |
| Black Swift | Absent | Outside Range |
| Lewis' Woodpecker | Present | Landbird Discussion/Severe Fire MIS |
| Williamson's Sapsucker | Present | Low Fire Severity MIS |
| Red-Naped Sapsucker | Present | Low Fire Severity MIS |
| White-Headed Woodpecker | Present | Low fire Severity MIS |
| Loggerhead Shrike | Present | Habitat Not Affected By Proposed Activities |
| Pygmy Nuthatch | Present | Landbird Species |
| Virginia's Warbler | Absent | Outside Range |
| Brewer's Sparrow | Present | Habitat Not Affected by Proposed Activities |
| McCown's Longspur | Absent | Outside Range |

Affected Environment and Environmental Effects – Old-Growth *Dedicated Old Growth*

Affected Environment

Two dedicated old growth (DOG) and/or associated replacement old-growth (ROG) habitats were affected by the Monument fire. DOG 04334PP (pileated woodpecker and pine marten habitat, 504 acres), along with the ROG (334 acres), burned in the Monument Fire. Both burned at severe or moderate-high fire severities. These DOG and ROG habitats no longer function as late-and-old structure habitat for the pileated woodpecker and pine marten. Essentially no live conifer habitat exists in these blocks of habitat. These DOG and ROG habitats reside along the south slope above the Little Malheur River, opposite the Monument Rock Wilderness and the Camp Creek drainage (Figure 16, Map Section).

The Monument Fire also affected a portion of ROG 04345PP (1,254 acres), which is the designated replacement stand for DOG 04345PP (410 acres). Sixty-nine acres of ROG habitat burned at moderate or severe fire severities. The fire significantly reduced or eliminated the function of this portion of ROG habitat. This ROG has also been impacted by past timber harvest activities.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, indirect, or cumulative effects were addressed.

Alternative 1 (No Action)

Direct and Indirect Effects

Alternative 1 would not present any direct effects to dedicated old growth habitats within the project area or within the larger analysis area. Habitat designations involving DOG and ROG habitats would remain, as currently existing. Habitat effectiveness for the species these DOG and ROG habitats would remain as described in the Affected Environment section.

Indirect effects resulting from selection of this alternative would include the opportunity lost in this decision to implement DOG and ROG management direction (MA-13 in the Forest Plan) on existing late and old structure habitat (931 acres) meeting requirements for pileated woodpecker and the pine marten. The current designated DOG and ROG 04334PP, which currently do not function, would remain part of the old growth network. Indirect effects would also include the lost opportunity to re-delineate ROG 04345 PP to meet Forest Plan direction and designate pileated woodpecker feeding areas (380 acres), which do not currently exist for either DOG. Over all, these two DOG habitats would not meet Forest Plan direction for designated habitats. There would be a net reduction of 838 acres in suitable habitat for pileated woodpecker and pine marten under the MA-13 designation.

Old growth habitat suitable for replacing DOG and ROG 04334PP would remain as it is currently, providing habitat for pileated woodpeckers and pine marten, even though it would not be designated or be included in MA-13.

Cumulative Effects

Cumulative effects from Alternative 1 would involve changes in the trend of suitable old growth habitat under MA-13 direction across the larger landscape. Selection of this alternative would result in a reduction of 838 acres of suitable habitat designated under the

MA-13 direction. This would add to the net reduction in suitable habitat designated under MA-13 across the landscape. Recent fire events in the Little Malheur River and North Fork Malheur River watersheds have also impacted DOG and ROG habitats. Subsequent analysis and decisions involving salvage removal of dead trees did not result in the re-delineation or other changes to those DOG and ROG habitats. Portions of those DOG and ROG habitats do not currently function as old growth habitat. Selection of this alternative would result in a cumulative trend in reduction of suitable old growth habitat for the pileated woodpecker and pine marten under MA-13 direction.

Cumulatively, adverse effects at the temporal scale would also occur. Maintaining existing designation under the No Action Alternative implies these habitats would continue to be managed for old growth habitat characteristics. Analysis by Knotts (1998) indicates a period from 240 to 280 years would be required for these stands to redevelop old growth characteristics (OFMS). Suitable habitat conditions for the pileated woodpecker and the pine marten would not be present in these stands until well after 180 to 200 years (Knotts 1998).

Alternatives 2, 3, 4, and 5

The direct, indirect, and cumulative effects of Alternatives 2, 3, 4, and 5 deals with the change in designation of habitats. Specifically, existing DOG and ROG habitats and habitats that currently meet habitat requirements for MA-13 designation, but are currently designated under other management area direction are at issue. Implementation of Alternatives 2, 3, and 4 will not result in a net increase of suitable habitat available to those species that select for that habitat condition.

Table W- 17. Changes for DOG/ROG and Pileated Woodpecker Habitat- Proposed Action

| Designation | Current Size (Acres) | Proposed (Acres) | Change (Acres) |
|--|---------------------------------|-----------------------------|---------------------------|
| Dedicated Old Growth 04334PP | 504 | 575 | +71 |
| Replacement Old Growth 04334PP | 334 | 356 | +22 |
| Pileated Woodpecker Feeding Area 04334PP | 0 | 380 | +380 |
| Dedicated Old Growth 04345PP | 410 | 410 | +0 |
| Replacement Old Growth 04345PP | 1,254 | 294 | -960 |
| Pileated Woodpecker Feeding Area 04345PP | 0 | 431 | +431 |
| Total | 2502 | 2446 | -56 |

Direct and Indirect Effects

Direct and indirect effects of Alternatives 2, 3, 4 and 5 would be designation and delineation of DOG, ROG and pileated woodpecker feeding area habitat as described in the FEIS. The current DOG and ROG 04334 PP habitat would be withdrawn from MA-13 designation and replaced with suitable habitat totaling 931 acres. In addition, 380 acres of pileated woodpecker feeding area habitat would be added. This habitat would replace the existing 838 acres not functioning as suitable habitat due to the fire. This change would result in a net increase of 473 acres managed under MA-13 direction and an increase of 1,311 acres of habitat that meets MA-13 habitat requirements.

Direct effects of Alternatives 2, 3, 4, and 5 would also include delineation of ROG O4345PP to meet Forest Plan direction and the delineation of a pileated woodpecker feeding area for DOG 04345PP. Total acres identified as ROG habitat would decrease by 960 acres. Of those 960 acres, 431 acres would be re-designated as a feeding area. A total of 529 acres of habitat would no longer fall under MA-13 direction.

There would be direct and indirect effects to pileated woodpeckers and pine marten in the form of suitable habitat protected and managed for those species. A total net increase in suitable habitat of 402 acres and an increase in suitable habitat of 782 acres managed under MA-13 designation would occur with implementation of this alternative. (Those additional 782 acres would be managed under MA-13 direction for the maintenance of suitable habitat for those species, as opposed to MA-1 and MA-22 direction as they currently exist).

Replacement of DOG 04334PP and associated ROG would result in the “movement” of that habitat designation into another watershed, approximately 6 linear miles west of its current location. This would change the landscape distribution of old growth habitat within the North Fork Malheur River and Little Malheur River watersheds. The significance of this lies in the current location of suitable old growth habitat, as well as recent changes to existing DOG habitats from similar fire events in the last 10 years.

Cumulative Effects

The cumulative effects of Alternatives 2, 3, 4, and 5 fall under the spatial and temporal scales and a measure in trend. Replacement of DOG 04334PP and associated ROG would result in the “movement” of that habitat designation into another watershed, about 6 linear miles west of its current location. This would change the landscape distribution of old growth habitat within the North Fork Malheur River and Little Malheur River watersheds. The significance of this lies in the current location of suitable old growth habitat, as well as recent changes to existing DOG habitats from similar fire events in the last 10 years. The effects of the Monument Fire within the Monument Rock Wilderness, which essentially functioned as one large block of suitable old growth habitat exceeding 8,000 acres and now is now longer functioning as such on most of the acres, further adds to the cumulative effects of Alternatives 2, 3, and 4 on spatial distribution of DOG and ROG habitats managed under MA-13 direction. With the effects of the fire, a large area is now with very limited acres of suitable old growth habitat. The fire has affected the distribution and connection of suitable old growth habitat across the landscape.

At a temporal scale, Alternatives 2, 3 and 4 decrease the length of time suitable old growth habitat is managed under MA-13 direction. With regard to Alternatives 2, 3, and 4, existing DOG and ROG habitat would be re-delineated to include suitable, functioning habitat. This would maintain roughly the same number of acres in suitable old growth habitat condition as existed prior to the Monument Fire. The re-delineation of these DOG and ROG habitats would counter the cumulative effects of the Monument Fire and declines in old growth functioning habitat outside of MA-13 habitat designation from past harvest actions, and would do so in a shorter time period than if alternative one were selected and the delay in the return of the existing DOG and ROG habitats to a functioning old growth habitat condition.

Connectivity

Affected Environment

Connectivity refers to a network of habitat between late and old structure (LOS) stands and dedicated old growth units that allow interior forest species to disperse and move between those areas. The intent of Regional Forester's Forest Plan Amendment # 2 is to provide connectivity corridors that do not necessarily meet the description of suitable habitat for breeding, but allow free movement between suitable breeding habitats. Within the corridors, medium diameter or larger trees are common, and canopy closure should be within the top 1/3 of site potential. Corridors should be at least 400 feet wide and must connect LOS with dedicated old growth units by at least 2 different directions. If appropriate stands are not available, then the next best stands will have to provide connectivity, and should be managed to improve connectivity.

Light mortality or underburn areas, partial burned, and unburned areas are currently providing the best connectivity in the area, and are likely the only stands that meet Forest Plan definitions of connectivity. Some stands identified as moderately burned such as unit 12 would provide connectivity, but most of the moderately burned areas and the severely burned areas have no green canopy, therefore would not provide connectivity. LOS blocks in the fire area are highly fragmented and limited. Connectivity would be provided by stand structure identified as young multi-story forest (YFMS). Young stands having two or more canopy layers that may be fairly open (UR and SEOC) would provide limited medium or large trees and limited overstory canopy, but would be the next best structure for providing connectivity. Those structures may not meet the Forest Plan definition.

There are breaks in connectivity especially along the east portion of the analysis area, but there is a network pattern between the fragmented LOS blocks. Two small separate stands (less than 16 acres each) identified as LOS north of the analysis area have no stands connecting them to each other or other LOS blocks due to the adjacent severely burned wilderness area. The extent of connectivity outside the analysis area is unknown due to lack of stand structure information.

Environmental Effects

The effects of all activities within the action alternatives were reviewed. Only those activities with direct, indirect, or cumulative effects were addressed.

Alternatives 1, 3, and 5

Direct and Indirect Effects

These alternatives would not change connectivity because no trees would be harvested in Alternatives 1 and 5 and no live trees would be harvested in Alternative 3. Salvage harvest in Alternative 3 would be harvesting only those trees determined to be dead using the tree mortality guidelines.

Cumulative Effects

All of the past, ongoing and foreseeable activities identified in the beginning of Chapter 3 have been considered for their cumulative effects on connectivity. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute positive or negative effects to connectivity habitat.

In Alternative 1 and in the low to moderate severity burn areas associated with Alternative 5; there are no cumulative effects. In Alternative 3 and in the severely burned areas of Alternative 5 conifer planting is planned. Past, ongoing, and planned conifer planting will cumulatively improve connectivity habitat. The improvement to habitat will be in the long term, but will still improve connectivity sooner than without the additional conifer planting.

Alternatives 2 and 4

Direct and Indirect Effects

The salvage harvest in these two alternatives would not change connectivity. The green tree treatment and precommercial thinning would change canopy closure that would result in more open stands.

In the commercial thinning units, a few acres of stands providing connectivity (YFMS) may be modified and decrease canopy closure. It is unknown if those stands would continue to meet the connectivity definition. Green tree removal in three of the commercial thinning units would be in open canopy stands (SEOC) that may not be currently meeting the connectivity definition. It would not be necessary for those units to provide connectivity due to the proximity of other adjacent connectivity stands. The best available connectivity would continue to exist with the green tree harvest of the commercial thinning units.

Cumulative Effects

All of the past, ongoing and foreseeable activities identified in the beginning of Chapter 3 have been considered for their cumulative effects on connectivity. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute positive or negative effects to the connectivity habitat.

In Alternatives 2 and 4, conifer planting is planned throughout the project area. Past, ongoing, and planned conifer planting within the project area will cumulatively improve connectivity habitat. The improvement to habitat will be in the long term, but will still improve connectivity sooner than without the planned conifer planting.

Consistency with Direction and Guidelines

Big Game Cover

The Malheur National Forest Plan requires that 20% of summer range and winter range be maintained as marginal and satisfactory cover. The Swamp Creek subwatershed meets this total cover summer range standard (see table W-10). The Upper Little Malheur River does not meet this standard because of the fire (see table W-10). None of the alternatives further reduce marginal and satisfactory habitat. Natural regeneration and planting are expected to re-vegetate forest although at different rates. Planting accelerates recovery of vegetation and development of hiding and thermal cover.

Habitat Effectiveness Index (HEI)

All alternatives proposed would be consistent with Forest Plan standards for summer and winter range HEI indices except for road densities in winter range. The Upper Little Malheur River subwatershed is not meeting the Forest Plan standard for the habitat effectiveness factor for roads (HE_R) in winter range (Table W-14).

The amended Forest Plan identifies a series of criteria relative to measurement of elk habitat effectiveness, through the use of a tool known as a Habitat Effectiveness Index (HEI) (USDA

Forest Service 1999). HEI models the relative quality of elk habitat based upon cover, forage, road densities, quality of cover, and the interrelationship of cover to forage habitats (USDA Forest Service 1999). The Forest Plan identifies the following figures as minimums across the Malheur National Forest for summer range habitats (Table W-14):

The Forest Plan also identifies HEI standards for winter range habitat. This applies to only winter range habitat within the subwatershed. The minimum values are identified as follows (W-14):

Winter range habitat only occurs within the Upper Little Malheur River subwatershed. No harvest activities are proposed within winter range area that would influence the total HEI values.

Road Densities-Summer Range and Winter Range

The Swamp Creek subwatershed currently meets Forest Plan standards for open road summer range density (see Table W-11). The Upper Little Malheur River subwatershed meets summer range open road standard but not winter range standards (see Table W-11).

Alternatives 2, 3, 4, and 5 close additional roads within the burn areas (see Tables W-12 and W-13). Following road closures, the Upper Little Malheur River subwatershed would still not meet winter range standards for any of the alternatives. In future environmental analyses, additional road closures would be considered in the unburned portions of the subwatersheds after post-fire recovery projects have been completed.

Goshawk

For northern goshawks, all alternatives are consistent with the Forest Plan and the Regional Forester's Eastside Forest Plans Amendment #2. No harvest is proposed within any post-fledging areas (PFAs). Natural regeneration and planting are expected to re-vegetate forest although at different rates. Planting would accelerate the recovery of vegetation and development of nesting habitat. Mature and old growth stands suitable for nesting adjacent the project area, as well as the existing nest sites, would be monitored annually for nesting activity. If new nest sites are identified within or immediately adjacent to the project area, management activities would be prohibited within ½ mile of the nest sites from April 1 to September 30 to avoid disturbing goshawks during the breeding season.

Migratory Birds

All alternatives are consistent with the 1918 Migratory Bird Treaty Act (MBTA) and the Migratory Bird Executive Order 13186. Alternatives were designed under current Forest Service policy for landbirds. The Northern Rocky Mountains Bird Conservation Plan (Altman 2000) and the U.S. Fish and Wildlife Service's Birds of Conservation Concern (USFWS 2002) were reviewed for effects disclosure. Salvage logging and other vegetation management cannot completely avoid unintentional take of birds, no matter what mitigations are imposed on the activities.

Endangered Species Act

All alternatives are consistent with the Endangered Species Act (see Appendix D, Wildlife Biological Evaluation). All alternatives will have **No Effect** on lynx, bald eagles, or gray wolves. Based on these effect calls, consultation with the US Fish and Wildlife Service was not necessary.

The Monument ID Team followed the streamlining process to address ESA issues related to the Monument Fire Recovery Project. The Monument ID Team met with the Malheur NF Level 1 Team seven times over a two-year period to discuss the Monument Fire Recovery Project. Of those seven meetings, ESA issues concerning wildlife species were discussed during five meetings:

11/14/2002: The ID Team met with the Level 1 Team for a general discussion of potential activities for the recovery project and potential ESA issues.

01/21/2003: The ID Team met with the Level 1 Team to discuss the draft proposed action for the Monument Fire Recovery Project.

02/11/2003: The Wildlife Biologist on the ID Team met with the Level 1 Team to discuss issues concerning Lynx.

03/19/2003: The Wildlife Biologist on the ID Team met with the Level 1 Team to discuss issues concerning Lynx.

06/17/2003: The ID Team and the Level 1 Team visited the Monument Fire Recovery project area and the Monument Fire area to discuss proposed activities for the Monument Fire Recovery Project, design criteria, and potential effects to threatened and endangered species.

Based on USFWS' review of the biological evaluation and supporting information provided in Level 1 team meetings, and field trips to the fire and project areas, USFWS did not object to the Forests' no effect determinations for lynx, bald eagles, or gray wolves.

Snag Retention

Alternative 4 would require a non-significant Forest Plan amendment for snags with its implementation of the salvage and commercial thinning harvest treatments. Alternatives 1, 2, 3, and 5 would meet plan snag standards.

This amendment for Alternative 4 is considered a non-significant amendment to the Malheur Forest Plan due the following factors (see Forest Service Handbook 1909.12): Timing; location and size; goals, objectives, and outputs; and management prescriptions.

Timing - The proposed change is taking place after the first decade of the current 1990 plan; but will be enacted before the next schedule revision. The next scheduled revision of the Malheur Forest is to begin in 2004 with an anticipated completion date of 2008. Therefore, the timing of this amendment is non-significant because of how late this change is occurring under the current Forest Plan.

Location and Size – The harvest area of the dead/dying trees (snags) is a small percentage of the available cavity excavator habitat in the two subwatersheds. The harvest area in the Swamp Creek subwatershed less than 13% of the subwatershed and in the Upper Little Malheur River it is less than 3% of the subwatershed.

Goals, Objectives, and Outputs – The Amended Forest Plan (USDA Forest Service, 1990) identifies a modified snag standard as follows:

“All sale activities will maintain snags and green replacement trees of greater than or equal to 21 inches dbh, (or whatever is the representative dbh of the overstory layer if it is less than 21 inches), at the 100% potential population levels of primary cavity excavators. This should

be determined using the best available science on species requirements as applied through current snag models or other documented procedures....”

The Forest Plan (Chapter IV, Forest Wide Standard 38) identifies the 100% potential population level as being 239 snags per acre over a 100-acre area, or roughly 2.39 snags per acre. It has thus been interpreted that the 100% potential population level under the amendment identified above would be 2.39 large snags (> 21” dbh) per acre (or 239 large snags (> 21” dbh) over 100 acres). This standard is based upon J.W. Thomas’ *Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington* (1979). This standard, through Thomas’ reference would cover most, if not all primary cavity excavator species associated with conifer habitats. This provided the rational for the snag standards developed for Alternative 2 and also is supported in Alternative 3.

Recently, DecAID was developed in Region 6 to address new trends and understandings about the function of dead wood habitats (snags and down logs) in a variety of different habitat types and conditions (Mellen et al. 2003; Johnson and O’Neil 2001). DecAID represents an advisory tool that presents a synthesis of data and research results pertaining to dead wood habitats in Oregon and Washington (Mellen et al. 2003). In and of itself, DecAID represents the latest information about deadwood habitats and their relationship to a variety of different deadwood dependent wildlife species. Information derived from DecAID and associated research that it includes seem to indicate that the standard of 2.39 large snags (>21” dbh) per acre may not be sufficient to meet the amended Forest Plan Standard identified above. .

Relative to the assumption that the amended Forest Plan refers to providing 100% potential population levels as having a snag density of 2.39 large snags (>21” dbh) per acre, Alternative 4 would not meet that standard across every acre. This would be due to the lack of retention of snags above and beyond those required to meet down wood requirements within harvest units (see description of alternatives in Chapter 2 FEIS).

Management Prescriptions – The proposed harvest of snag habitat would not detract from or jeopardize the Forest Plan goals because of the small magnitude of change in snag availability and the large reserve of snags remaining in the Monument Rock Wilderness.

Dedicated Old Growth

Alternatives 2, 3, 4, and 5 would require a non-significant Malheur Forest Plan Amendment to make the proposed changes to dedicated old growth and replacement old growth habitat. This is considered a non-significant amendment to the Malheur Forest Plan due the following factors (see Forest Service Handbook 1909.12): Timing; location and size; goals, objectives, and outputs; and management prescriptions.

Timing - The proposed change is taking place after the first decade of the current 1990 plan; but will be enacted before the next schedule revision. The next scheduled revision of the Malheur Forest is to begin in 2004 with an anticipated completion date of 2008. Therefore, the timing of this amendment is non-significant because of how late this change is occurring under current Forest Plan direction.

Location and Size – The re-delineation of old growth and replacement old growth to another area maintains about the same size as the previous area and would be located in the closest available LOS stand.

Goals, Objectives, Outputs, and Management Prescriptions - The Monument Fire affected the function and character of one dedicated old growth habitat and two replacement old growth habitats within the fire perimeter. Dedicated old growth impacted by fire no longer provides habitat conditions to meet pileated woodpecker and pine marten habitat requirements. The associated replacement old growth also no longer functions as suitable habitat for those species. The other affected replacement old growth habitat does not meet Forest Plan direction for the type of habitat to be included and the number of acres designated towards that purpose. Alternatives 2, 3, and 4 propose the re-delineation of the dedicated old growth and two replacement old growth habitats such that they include habitat features and conditions suitable to the pileated woodpecker and the pine marten and meet Forest Plan direction.

Irreversible/ Irretrievable Effects

The loss of snags would be an irretrievable loss until replacements function as snags. There are no other irreversible or irretrievable commitments of resources associated with wildlife or wildlife habitat that may result from the implementation of alternatives.

Recreation

Regulatory Framework

Management Direction

The Forest Plan direction is to manage General Forest and Rangeland (MA 1 & 2) to:

- construct, relocate, or protect designated system trails and facilities during management activities;
- maintain dispersed camping opportunities in a roaded setting, and to manage these areas for partial retention;
- provide roaded recreation opportunities.

Manage Monument Rock Wilderness (MA 6B) in accordance with values specified in the Wilderness Act of 1964 and the Oregon Wilderness Act of 1984. Preserve and protect the wilderness character of the resource. Provide for recreational, scenic, educational, scientific, and historical uses. Manage for primitive recreation opportunities under the Wilderness Recreation Opportunity Spectrum system. The Monument wildfire burned approximately 11,500 acres of the Monument Rock Wilderness. These acres are not included in the Monument Fire Project Area.

Elk Flat Springs is a Forest Camp and is not listed as a developed campground in the Forest Plan, therefore it does not show up as MA 12, even though it is managed as a developed campground. This site is managed as a Developed Recreation Site (MA 12) to provide opportunities for interpretation and enhancement of natural resources and the Recreation Opportunity Spectrum (ROS) system for this area is managed as roaded modified. The rest of the project area is managed as roaded natural.

Analysis Method

GIS was used to identify dispersed campsites. The recreation analysis considered the area within the fire boundary.

Affected Environment

The Monument Fire Recovery project area includes two developed recreation sites, Elk Flat Springs Forest Campground, and Little Malheur Trail/Trailhead on the south end. Table Rock Trail/Trailhead and Little Malheur Trail/Trailhead on the north end are outside the planning area, but are connected resources. Most of the dispersed campsites are along the Little Malheur River with the rest scattered throughout the roaded portion of the planning area. The area receives low to moderate levels of use from local residents gathering forest products, hunting, riding Off Highway Vehicles (OHVs) and snowmobiling.

This area plays an important role by providing settings for various types of outdoor recreation hunting, camping, driving in the woods, hiking and winter activities. Viewing opportunities are abundant within the Monument Rock Wilderness area. Due to ease of access from Forest Service Roads (FSR) 16 and 13, this area is popular with recreationists where visitors may enjoy the project area for outdoor recreational opportunities. With the exception of FSRs 16 and 13 the major roads, corridors are gravel-surfaced, one-lane, and native surface routes initially developed to provide timber and mineral access, which now provides access for recreation type activities. Mushroom gathering is expected to greatly increase this year and then taper off in the following years. Recreational hunting for shed deer and elk antlers and other activities occur as well. Viewing scenery and enjoying the landscape is a part of all these activities. Such as FSR 1370 (Table Rock Visual Corridor) and Table Rock Lookout area are located in the Monument fire, just outside the project area with views into the project area from Monument Rock Wilderness and the Wallowa Whitman National Forest.

Environmental Effects

Direct/Indirect Effects:

Alternative 1: No Action Alternative

This alternative would result in little change from the existing condition. While recreational visits within the analysis area would remain near the same levels as previous years under this alternative, traditional use patterns and recreational opportunities would be impacted. Recreational use would probably remain fairly static.

The fire did not affect Elk Flat Springs Campground and this site will remain intact as is.

Forest Service Roads 16 and 13 have traditionally provided access to dispersed campsites. Day use activities such as fishing, sight seeing and driving roads would decrease due to hazard trees. Hazard trees along roads, trailheads, trail crossings, developed recreation sites and dispersed campsites would increase public safety risks. Due to these hazardous situations, based on past observations, motorists would likely create new parking and camping areas to replace the traditional used roads and sites. This would increase ground disturbance in the project area.

No improvement of road access will decrease the opportunities for those who prefer an easily accessed setting due to no timber harvest, which will lead to a decrease in hunting, fishing, and other recreational use of an area because usually improved road means better access resulting in an increase of recreational visitors. It is expected that as human populations increase and as recreational means of transportation advances, this will be an associated increase in need for road-related recreation activities.

The existing characteristic of the Monument Rock Wilderness would remain the same.

Large fires can be distracting or dangerous to Forest visitors and they modify the recreation setting. This will cause people to relocate to other areas that may not have been previously impacted from human use.

The fire did not change ROS classification, so it will not change as a result of this alternative.

The various types of outdoor recreation hunting, camping, driving in the woods, hiking and winter activities will continue.

The temporary road closure on FSR 1672457 at the junction of 1672 has created a spot for people to park to walk up FSR 1672457 to access the existing trailhead and Little Malheur trail #366. This is not a developed site and a foreseeable action would be to relocate the trailhead to this site and create a connecting trail out of the existing FSR1672457 under another NEPA document.

Alternatives 2, 3, and 4

The action alternatives would result in little change from the existing condition and the ROS classification will remain the same. Some improvement of road systems would be noticed (surface and drainage structures). With a recovery only approach, some road segments may be improved and road management enhanced increasing recreational travel use.

Improvement of road access will increase opportunities for those who prefer an easily accessed setting due to management activities associated with the project, which will improve access for hunting, viewing scenery, fishing, and other recreational use of the area. With the exception of temporary and short-term displacement of recreationists during the time management activities actually take place, there are no long-term direct, indirect, or cumulative effects to recreation settings or overall opportunities expected from harvest activities.

There is the potential to displace some recreationists who traditionally use the area through the closing of some of the forest roads in the area that were previously open, i.e. some recreationists may find the road to their favorite hunting spot closed. With the temporary closure on FSR 1672494 some dispersed camping will not be assessable to recreationists. Also, the road closure will limit access to the Little Malheur Trailhead on the south end limiting some people from utilizing the trail system and Monument Rock Wilderness. Permanently closing this road is outside the scope of this analysis, and will be addressed in another NEPA process. Although the action alternatives propose to close some roads after management activities, others will remain open. While harvest activities are occurring, FSR 1672494 will be closed to public access for safety concerns for a short period. Helicopter activity over the road will be unsafe for the public and raises concerns for people being in the area at that time. Also, the Little Malheur Trail and Trailhead will be closed during harvest activities due to safety concerns with the activity of helicopters flying overhead with logs.

The temporary closure will be posted on the ground at the north end trailhead and on FSR 1672494.

The fire did not affect Elk Flat Springs Campground and this site will remain intact as is. There would be a slight increase in big game hunter opportunities, as improvement in habitat (particularly forage) should increase big game populations (elk and mule deer), starting in the summer of 2003. Realizing that changes in big game hunter opportunities might occur at any time that the Oregon State Fish and Game Department significantly change big game hunting regulations.

Hunting may be less desirable for some people until new under-story vegetation is established. Although future recreation use within the project area is difficult to determine, visitation has increased rapidly in the past few years. As the project area changes over time, so may the make-up of visitors and the activities they pursue. Recreationists will have to either adapt to the new situations or seek another area in which to recreate.

Dispersed recreational opportunities would result in some change from the existing condition. Three existing dispersed campsites would remain in the same condition and location. The one dispersed campsite identified as having some soil and vegetation disturbance will be closed with boulders limiting camping at this site under the Camp Creek suppression rehab plan. Under these alternatives 16 dispersed campsites will temporarily not be available for vehicle camping with the closure of the 1672494 temporary closure.

In alternative 2 with the reduced level of dead standing trees may reduce safety concerns for the recreating public who enjoy cross-country travel and dispersed camping. Also with alternative 2 the reduced level of down fuel will create traveling by foot easier for the recreating public.

Winter recreation would result in little change from the existing condition. Current winter recreation numbers are dependent upon snow conditions, as trail systems in the Monument Fire Recovery Analysis are managed under a Challenge Cost Share Agreement with the local snowmobile clubs.

Hazard trees along roadways, trails, and trailheads will be managed for hazards and felled. Trails are open for public use.

The recreational experiences available may be changed by road and harvest activities at some recreation sites. Certain recreation experience needs will not be satisfied, based on the extent to which the natural environment has been modified, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. The possible effects include increased sights and sounds of equipment, people, and helicopter within the planning area during harvest activity. The visual character of some recreation sites will also be changed from management activities.

Helicopter harvest of stands adjacent to the Wilderness area may result in indirect, short-term effects on remoteness within the area. Potential effects include increased sights and sounds of helicopter, people, and equipment adjacent to portions of the Wilderness boundary during harvest activity, along with other management activities.

In alternative 3 with the high level of snag habitat left in the RHCAs may pose safety concerns for the recreating public who enjoy camping alongside streams.

Alternative 5

No timber harvest will occur resulting in more down material on the ground for recreationist to maneuver over. As dead and damaged trees fall, cross-country travel will become difficult. People will have to crawl over downed material to get from one place to another.

With more road closures by gates will decrease access to those who prefer an easily accessed setting. The road closures will decrease access for hunting, viewing scenery, and other recreational use of the area by motor vehicles. There is the potential to displace some recreationist due to the increase of road closures limiting access to favorite campsites and hunting areas.

There will be an increase in a more solitude hunting experience from the road closures. Limiting vehicle noise the hunting experience will be changed.

Cumulative Effects

Recreation activities will continue. With additional projects planned or likely planned harvest type activities may have an effect on the ROS and an effect on the recreation resources. There may be adverse impacts to publics who hunt, camp, gather mushrooms or berries, and hike within the project area as roads are removed from the transportation system. Areas once easily accessible to the public may require additional effort (e.g., longer hikes or use of horses) to be accessed.

It is useful to keep in mind that activities vary in importance over time. Therefore, sites that are there today may not be in the future. So this data is valid only over an intermediate length of timeframe.

Consistency with Direction and Regulations

All alternatives are consistent with Forest Plan direction and regulations. There are no irreversible or irretrievable commitments related to recreation from this project area.

Visuals

Regulatory Framework

The Malheur NF scenic resource is managed by direction provided in the Malheur NF Plan (1990). Visual Quality is assessed and evaluated under Landscape Aesthetics, USDA Forest Service Handbook Nr. 701, December 1995. The Malheur National Forest Plan includes Forest-wide management area (MA) standards:

Viewshed Corridor

One visual corridor is located in the Monument Fire Recovery Project that is prescribed for special management in the Malheur Forest Plan, Management Area 14. The Table corridor (Sensitivity Level 2) is along FS Road 1370 on the north edge of the project areas. (Appendix L - Malheur LRMP). No visual corridor plan has been completed for Table Rock scenic viewsheds.

This management area consists of the visible and potentially visible landscapes along major travel routes where the traveling public has a high to medium sensitivity to the scenery. The

Level 2 corridors should meet a visual quality objective of partial retention in the foreground areas and modification in the middleground.

To meet partial retention standards, management activities may be evident to the viewer but must remain visually subordinate to the surrounding landscape. For modification standards, management activities may visually dominate surrounding landscape, but must borrow from naturally established form, line, color, and texture.

Outside the Viewshed Corridor

The visual management goal for Management Areas 1 (General Forest) and 4A (Winter Range) is to manage for maximum modification, which is heavily altered in appearance. Deviations may strongly dominate the landscape character, however, they must be shaped and blended with the natural terrain so that elements such as unnatural edges, roads, and landings do not dominate the composition. Management Area 13 (Old growth) and Riparian Management Areas are managed for visual management objectives consistent with adjacent lands.

Analysis Method

Management activities such as timber harvesting can affect forest scenic quality by changing the predominant form, color, line, or texture in a given viewing area. The degree of visibility of these events depends on the interaction of certain elements to the viewers such as:

- Slope and aspect of the land
- Surrounding landscape
- Frequency and duration of view
- Fuel reduction treatment methods used
- Slash disposal methods

These factors have been incorporated into the analysis of the effects of each alternative in meeting VQOs. VQOs are minimum guidelines for meeting Forest Plan visual goals. The Malheur National Forest's visual resources are managed under the USDA's National Forest Scenery Management System located in Agricultural Handbook Number 701. The scope of the analysis is limited to the area burned by the fire.

Affected Environment

The visual corridor portion of the project area near Elk Flat Camp is a dense lodgepole stand. The stand has moderate to severe burn severity damage. The visual integrity was reduced by this fire damage and fire suppression activities including firelines and stumps that are easily seen from the road.

Distant portions (background) project area can be seen along road near Elk Flat and the Table Rock Lookout. Most of the project area can not be viewed from visual corridor or lookout.

Environmental Effects

Direct and Indirect Effects

All Alternatives

The effects on visuals are the same for all alternatives for foreground and middleground views since there are no proposed activities in these regions. The current visual appearance will be maintained along the visual corridor to Forest Plan standards.

Alternatives 1 (No Action) and 5

Since there is no harvest proposed for Alternatives 1 and 5 there would be no change in background views.

Alternatives 2, 3, and 4

Background views will be slightly alternated from the Salvage and Resiliency Treatments. There would be texture difference between the harvest areas and Monument Rock Wilderness. The harvest of the dead trees and the live trees over 12" dbh will most evident along the ridgetops in the Camp Creek drainage. This effect will lessen as the dead trees fall over after 10 to 15 years and the planted conifers grow to create diversity of color and texture with scattered dead trees.

Cumulative Effects

All Alternatives

No visual cumulative effects of past, ongoing, or foreseeable activities are anticipated with the implementation of any of the alternatives.

Consistency with Direction and Regulations

Visual Quality Objectives (VQOs) are minimum objectives and can be managed to a higher level where feasible. The proposed treatments identified in Alternatives 2, 3, 4 and 5 will meet Forest Plan standards.

Irreversible/ Irretrievable Effects

There are no irreversible and irretrievable commitments that would affect visual resources by implementing any of the proposed alternatives.

Cultural Resources ---

Regulatory Framework

The legal framework mandating the Forest to consider the effects of its actions on cultural resources is wide-ranging. In this case, Section 106 of the National Historic Preservation Act (NHPA) of 1966⁴⁰ is the foremost legislation that governs the treatment of cultural resources

⁴⁰ NHPA as amended in 1976, 1980, and 1992

during project planning and implementation. Federal regulations such as 36 CFR 800 (Protection of Historic Properties), 36 CFR 63 (Determination of Eligibility to the National Register of Historic Places), 36 CFR 296 (Protection of Archaeological Resources) and Forest Service Manual 2360 (FSM 2360) clarify and expand upon the NHPA. The Pacific Northwest Region (R6) of the Forest Service, the Advisory Council on Historic Preservation (ACHP), and the Oregon State Historic Preservation Office (SHPO), signed a programmatic agreement (PA) regarding the management of cultural resources on National Forest system lands in 1995. The 1995 PA outlines specific procedures for the identification, evaluation, and protection of cultural resources during activities or projects sponsored by the Forest Service. It also establishes the process that the SHPO utilizes to review Forest Service undertakings for NHPA compliance.

The National Environmental Policy Act (NEPA) of 1969 is also a cultural resource management directive. It calls for agencies to analyze the effects of their actions on socio-cultural elements of the environment. Laws such as the National Forest Management Act (NFMA) of 1976, the Archaeological Resources Protection Act (ARPA) of 1979, the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, and Executive Order 13007 (Indian Sacred Sites) also guide Forest Service decision-making as it relates to Heritage. The American Indian Religious Freedom Act (AIRFA) of 1978 requires that federal agencies consider impacts of their projects on the free exercise of traditional Indian religions.

The Malheur National Forest Land and Resource Management Plan tiers to the previously-mentioned laws and corresponding Forest Service manual direction as it sets forth resource management goals, objectives, and standards. Forest-wide management standards pertinent for this cultural resource effects analysis include:

- Conduct a professionally supervised cultural resource survey on National Forest lands to identify cultural resource properties. Use sound survey strategies and the Malheur National Forest Cultural Resource Inventory Survey Design.
- Evaluate the significance of sites by applying the criteria for eligibility to the National Register of Historic Places.
- Consider effects of all Forest Service undertakings on cultural resources. Coordinate the formulation and evaluation of alternatives with the State cultural resource plan, the State Historic Preservation Office and State Archaeologist, other State and Federal agencies, and with traditional and religious leaders of Native American Indian groups and tribes with historic ties to the project planning area.

Analysis Method

The Area of Potential Effect (APE) for Heritage resources includes the Monument planning area. The APE also extends one-quarter mile beyond the outer perimeter of the planning area, and three helicopter log landings (covering 10 acres each) located external to the planning area.

Cultural resource identification efforts in the vicinity of the Monument planning area have focused on three primary types of resources: prehistoric archaeological sites, historic archaeological sites, and places that support resources of contemporary tribal interest. Cultural resource identification efforts conducted in the area include four pedestrian cultural

resource inventory surveys (Monument, Awake, Hunter, and Tramp), literature reviews, and consultation with American Indian tribes and other stakeholders historically associated with the area. A cultural resource inventory survey, conducted in support of the Monument Fire Recovery project, examined an area of 7,300 acres, with a stratified sample survey strategy approved by the Oregon State Historic Preservation Office (Thomas 1991). An area of approximately 2,500 acres south of the Little Malheur River was adequately surveyed for cultural resources during the Awake timber sale project (Bailor 1994). Other cultural resource inventory surveys conducted in the vicinity of the planning area were associated with the Onion and Alarm timber sale projects and the Elk Flat project.

Affected Environment

The most frequently encountered archaeological resources in the Monument planning area are scatters of lithic remains distributed in variable densities and related to occupations of hunter-gatherers that span several thousand years. Obsidian and cryptocrystalline silicate (chert, flint) materials are both commonly present within archaeological assemblages. These lithic scatters are generally of limited area (<5 acres), and several display potential for buried archaeological deposits. The largest and most complex lithic scatter in the planning area covers more than 26 acres. A sparse lithic-oriented archaeological deposit associated with a rockshelter, represents a cultural resource that has potentially high scientific value. Eighteen lithic scatter archaeological sites have been identified within one-quarter mile of the planning area boundary. All of these sites have been evaluated as eligible or potentially eligible for the National Register of Historic Places (NRHP). Over the course of the last century, these 18 sites have been impacted by a variety of land management activities. According to previous site records, combined effects of timber harvest, livestock grazing, and road construction have moderately to heavily impacted the site integrity at nine of the sites. The most recent site documentation noted impacts associated with logging and grazing at 6 sites. A Burned Area Emergency Recovery (BAER) team assigned to the Monument Fire found that archaeological values did not appear to have been compromised by the fire, and in two instances, lithic scatter sites appeared to have been disturbed by fire suppression efforts.

Recent research suggests the scientific value of obsidian-dominated lithic scatters located at or near the surface of the ground, is often degraded by surface temperatures generated during high and moderate-severity wildfires (Trembour, 1990). Seven of the existing lithic scatters within the project APE are located in areas of high fire severity. Primarily because of fire, logging, and grazing-related impacts, archaeological site integrity is generally declining. This rate of decline has most likely accelerated during the past 100 years of active land management.

Historic archaeological resources may include foundations or structural ruins, or features such as privy pits, trash dumps, and blazed trees. Sites with historic archaeological components in the planning area are believed to be associated with Depression-era livestock grazing activities and early Forest Service land management. Site constituents for this type of deposit typically include scatters of solder-sealed tin cans, tobacco tins, bottle glass, nails, and miscellaneous fragments of tin and iron hardware that are greater than 50 years of age. There are 7 identified archaeological sites within the APE that display a historic period component. Four of these sites have been evaluated as eligible or potentially eligible for the National Register of Historic Places (NRHP).

The condition of the archaeological record of the historic period is extremely poor. Resources deposited by cultural occupation during the middle of the 20th century are almost always situated at or very near to the surface of the ground, and are therefore more vulnerable to surface disturbances such as trampling, burning, and artifact collecting. All sites have been altered to a high degree by timber harvest, livestock grazing, road construction, dispersed recreation, and fire-related impacts. No historic components of archaeological resources within the APE possess the integrity necessary to contribute to NRHP significance.

The National Environmental Policy Act and other authorities require that federal agencies consider the impact of their actions on cultural uses of the natural environment, such as those practiced by present-day communities of American Indians. Resources of contemporary tribal interest may include traditional cultural properties (NPS 1990), areas important for the practice of Indian religion, Indian sacred sites on federal lands, and areas supporting cultural uses of the natural environment (i.e., subsistence use of plants or animals). Presently, there are no specific places within the Monument Fire affected environment determined to be important for traditional American Indian land uses. The Burns Paiute have, however, expressed a concern regarding the population and distribution of culturally important plant species on all parts of the Forest during previous consultation. Stream bottoms along Camp Creek and the Little Malheur River provide habitat suitable for hardwood shrubs of interest to the tribe, such as *Prunus virginiana* (chokecherry), *Salix* spp. (willow), and *Populus tremuloides* (quaking aspen).

Environmental Effects

Direct and Indirect Effects

Alternative 1 – No Action

There would be no direct effect on the cultural resources identified within the Monument Fire Recovery Area under the No Action alternative, as no salvage, fuels reduction, reforestation, or watershed improvement activities would be implemented. However, with no implementation of reforestation or watershed improvement activities, it would be more likely that archaeological sites could be impacted by erosion or flood events. Archaeological sites would also be more likely to sustain damage from additional high severe wildfires. If vegetative cover is not re-established and access to the planning area is not reduced, archaeological sites may be exposed to elevated levels of surface collecting or vandalism.

Effects Common to Alternatives 2, 3 & 4

Cultural resources could sustain a wide range of adverse effects under Alternatives 2, 3, or 4. Actions necessary for the salvage of dead and dying trees, such as felling, skidding, decking, and slash disposal, may have direct detrimental effects on archaeological deposits situated within or adjacent to the project area. Proposed harvest units in Alternative 2 encompass 8 sites, Alternative 3 – 5 sites, and Alternative 4 – 7 sites. Complete site avoidance is the preferred form of treatment for archaeological resources that have the ability, or may have the ability, to yield scientific data (Keyser et. al., 1988). Risks of site disturbance during log removal would vary in accordance with the logging system utilized. Helicopter-logging systems will be employed exclusively within the Little Malheur River watershed, minimizing the risk of site disturbance during log removal, by reduction of log skid distances and number of necessary log landings. No more than 23 helicopter log landings and service landings will

be constructed under any action alternative. All proposed logging within the North Fork Malheur River will be ground-based. Ground-based logging systems require more log skidding, and are more likely to result in the disturbance of archaeological sites (Table C-1).

The risks that cultural resources face from additional severe wildfire events would diminish as standing large diameter fuels are reduced. Under Alternatives 2, 3, or 4, harvesting of potential large diameter fuels would reduce fuel loading and the risk of high-severity wildfire (Fire/Fuels Chapter 3).

Some habitat for plants traditionally important to the regional tribes of American Indians will be enhanced by the vegetation treatments. Cultural plant stands in upland areas may realize a limited positive effect under Alternatives 2, 3 and 4, as fuel loading is addressed across the landscape. Habitat for species of cultural plants that inhabit upland portions of the planning area (i.e., bitterroot, biscuitroot, onion) will be avoided.

Effects Common to Alternatives 2, 3, 4, & 5

For Alternatives 2, 3, 4 and 5, identified lithic scatter archaeological sites may be damaged by reforestation measures conducted in their vicinity. Conversely, the same lithic-oriented archaeological sites may realize an indirect beneficial effect, as reforestation stabilizes erosive soils and stream banks. Reforestation will expedite the establishment of vegetative cover over fire-exposed archaeological resources, and reduce the likelihood that lithic scatters will be impacted by surface collection.

Activities associated with the construction of temporary roads and landings (only Alternatives 2, 3, and 4), as well as road decommissioning, can also degrade the integrity of archaeological sites. No more than 11.8 miles of road will be decommissioned under any Action Alternative. Road closures and decommissioning might also protect fire-exposed archaeological resources from artifact collecting and vandalism, to an unknown degree, as access is reduced.

Table C-1. Activities Planned in Areas Classified as High-Probability for the Occurrence of Cultural Resources.

| Activity | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|-----------------------------|---------------|---------------|---------------|-------------------------|
| Tractor harvest | 293 acres | 152 acres | 293 acres | No Harvest |
| Helicopter harvest | 1,786 acres | 826 acres | 1,064 acres | No Harvest |
| Reforestation | 2,786 acres | 2,786 acres | 2,786 acres | 2,786 |
| Temporary road construction | 0.1 mile | 0.1 mile | 0.1 mile | No Temp Rd Construction |

Delineation of new Dedicated Old-growth areas, Replacement Old-growth areas, and pileated woodpecker feeding areas would have no effect on any identified cultural resource.

Cumulative Effects

For cultural resources identified within the Monument affected environment, the cumulative or incremental nature of two distinct types of cause-and-effect relationships will be analyzed. Cumulative effects issues considered include: 1) incremental effects of heavy machinery

operating adjacent to known archaeological sites; and 2) potential effect to identified cultural resources of changing fuel-loading conditions in the project area.

Past, Ongoing & Forseeable

Alternative 1 (No Action) and Alternative 5

Alternatives 1 and 5 would not reduce standing dead fuel across the landscape within the Heritage resource APE and not incrementally reduce risks that the resource will experience future severe wildfire events. The threat of a severe or moderately-severe wildfire, will contribute to long-term stability of archaeological sites.

Effects Common to Alternatives 2, 3 & 4

Previous mechanical timber harvest projects, livestock grazing, wildfires, road construction, and dispersed recreation have had incremental negative effects on the 16 historic properties identified within the Monument Area of Potential Effect for cultural resources. Reasonably foreseeable future activities in the planning area include riparian shrub planting, prescribed fire, and livestock grazing. Identified historic properties will be avoided, and project implementation will be halted if it is determined that a historic property has been damaged or may become damaged. Use of helicopter-logging systems in the Little Malheur River watershed will minimize ground disturbance in the vicinity of the 14 historic properties located in Little Malheur portion of the planning area. There is minimal risk of additional incremental degradation of historic properties associated with the proposed action and its alternatives. Project-related disturbance of archaeological resources, in combination with more severe disturbances related to previous timber harvest projects and livestock grazing, may diminish the scientific value of the 16 NRHP-eligible sites.

Alternatives 2, 3 and 4 reduce standing dead fuel across the landscape within the Heritage resource APE to some extent and incrementally reduce risks that the resource will experience future severe wildfire events. Actions reducing the likelihood of a severe or moderately-severe wildfire, will contribute to long-term stability of archaeological sites. The proposed activities in combination with: 1) past activities, 2) Wallowa-Whitman National Forest fire recovery efforts, and 3) prescribed burning projects planned in the foreseeable future, will reduce threats posed by intense wildfire to Monument archaeological sites.

Consistency with Direction and Regulations

National Historic Preservation Act

Nineteen sites in the Monument Project Area have been evaluated as significant and are therefore eligible for inclusion to the NHRP. All sites that have been evaluated as eligible or potentially eligible will be strictly avoided during ground-disturbing activity. Log landings or other ground-disturbing activities will not be permitted in the vicinity of eligible historic properties.

Prior to project implementation, State Historic Preservation Office consultation will be completed under Programmatic Agreement⁴¹.

⁴¹ Programmatic Agreement references an agreement among the United States Department of Agriculture, Forest Service, Pacific Northwest Region (Region 6), The Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Officer regarding Cultural Resource Management on National Forests in the State of Oregon, dated March 10, 1995, pursuant to the stipulated Forest Archeologist review dated November 15, 1996.

Tribal Interests

All tribes of federally-recognized American Indians have off-reservation interests, and some maintain treaty-reserved rights on public lands within ceded territories. No tribes or groups of American Indians maintain treaty-reserved rights within the Monument Fire Recovery planning area. However, the planning area does lie within overlapping areas of interest that have been recognized for the Burns Paiute and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). According to the Eastside Draft Environmental Impact Statement (Interior Columbia Basin Ecosystem Management Project, 1997), these areas of geographic interest are loosely based upon historic tribal ranges, traditional use areas, and zones of influence. Also, the Monument planning area is within six air miles of the area of interest defined in the Eastside DEIS for the Confederated Tribes of the Warm Springs Reservation (CTWSR).

The “inherently sovereign” status of federally recognized Indian tribes requires that land managing agencies consult with tribes on a government-to-government basis over planned actions that may affect tribal interests (McConnell, 1991). Some examples of tribal interests include: traditional cultural practices, ethnohabitats, sacred sites, certain plant and animal resources, and socio-economic opportunities. The Malheur National Forest Land and Resource Management Plan also directs the Forest to consult with tribes about effects of projects planned within their areas of historic interest (Malheur LRMP, 1990).

At early stages of the planning process, the District initiated government-to-government consultation with tribes that have an area of interest that includes the Monument Fire Recovery project area. To date, tribal consultation efforts consist of scoping letters mailed to each potentially-affected tribal council, e-mails sent to tribal resource specialists, and a face-to-face meeting with resource specialists of the Burns Paiute tribe. The consultation process did not result in documentation of any specific concerns regarding project impacts on resources of tribal interest. The Burns Paiute tribe did express a general concern regarding cultural plant habitat and access management within all areas burned in the fire season of 2002.

Irreversible/ Irretrievable Effects

There are no irreversible and irretrievable commitments that would affect cultural resources by implementing any of the proposed alternatives.

Range _____

Regulatory Framework

The Malheur National Forest Land and Resource Management Plan allows and encourages grazing (USDA Forest Service, 1990). Stated goals include (FLMP IV-2):

- Providing a sustained production of palatable forage for grazing by domestic livestock and dependent wildlife species (FLMP, 1990).
- Managing rangelands to meet needs of other resources and uses at a level responsive to site-specific objectives.
- Permitting livestock use on suitable range when a permittee manages livestock using prescribed practices.

Post-fire grazing interim guidelines will be followed as issued for the Malheur National Forest by the Forest Supervisor. Some items considered in this guideline are amount of acres, fire intensity and vegetation community condition pre and post fire. Monitoring will be done on an annual basis to determine when grazing will be allowed in areas that were burned based on the parameters of the guideline.

Analysis Method

The area impacted by the fire was summarized as it relates to the whole of the allotments impacted.

Affected Environment

Livestock grazing has been a part of the landscape of the Malheur National Forest since the 1860's when the first miners and homesteaders entered this area. Both domestic cattle and sheep have grazed allotments within the planning area. Cattle have almost exclusively foraged these allotments in the past 40 years. However, sheep were brought back into grazing in this area in 1998. Although livestock grazing on National Forest System lands has decreased since the early 1900s, the ranching industry remains an important part of the Grant and Baker County economies.

Early grazing was essentially unregulated and resulted in resource impacts. Some effects from past practices are still observable today. During the middle part of the century, the Forest Service took significant action to regulate livestock numbers and to establish workable grazing seasons and allotments. In the latter part of the century, emphasis shifted to development of range management systems and regulation of effects on specific resources. During the past twenty years or so, emphasis has been on protection and management of riparian and aquatic habitats.

According to Area Ecologist, Charlie Johnson, there has been a marked improvement on most rangelands on the Malheur National Forest since the 1970s. However, the impacts at the turn of the century and continuing into the 1950s were sometimes too severe for the dry, warm non-forested communities to sustain. The result was degraded rangeland ecosystems with little opportunity (time) for natural rectification (reasserting of balance) for the natural community. He notes the improvements since the 1970s were mainly where rotational grazing (deferred or rest) were implemented, generally with added fencing.

Charlie Johnson's notes from the mid 1990s characterize the vegetation within the planning area as outside the normal range of variation. He asserts key factors influencing this are severe disturbance and a lack of maintenance disturbance processes. Because fire has such a profound influence on the ecosystem the curtailment of fire's natural cycle combined with livestock grazing has significantly contributed to the ecosystems being outside natural variation. Although his report was generated for other reasons, he adds that present health of vegetation within allotments also relates to the incursions by administrative projects to harvest trees. The removal of larger trees coupled with removal of fire from the ecosystem has led to promotion of later seral tree species when fire seral tree species were favored in the removal. These plant communities are now far outside the natural range of variation, which effects the overall rangeland/allotment health and production. (Charles G. Johnson, Jr; Summary Report for Rangeland Health on Selected Allotments, 6/6/95). For these reasons, prior to the Monument Fire, it was difficult to state that upland range conditions were continuing to improve, as the reverse may be more appropriate.

The Monument Fire impacted two grazing allotments. They are the North Fork and Spring Creek C&H Allotments. This analysis will only deal with those areas out side of the Monument Wilderness.

The North Fork Allotment is permitted for use by 450 cow/calf pairs for a period of June 15 through October 11 under a six unit deferred rotation system. The Camp Creek Unit, which was totally burned, is planned for rest from grazing for at least two growing seasons in compliance with the Forest's Post Burn Grazing Guidelines.

Two other units Mountain and Squaw Creek were partially burned in the fire. Only a few lightly burned upland areas exist in both units. Burned aeas consist primarily of elk sedge and pine grass which requires little fo no recovery time after a light burn. The post fire guidelines allowed grazing to resume in 2003 in these units.

The Spring Creek Allotment is permitted for use by 600 cow/calf pairs or 2800 ewe/lamb and 40 cow/calf pairs for a period of June 10 through October 25 under a twelve unit deferred rotation system. The bulk of the Elk Flat unit was burned in the Monument Rock Wilderness. Only the unburned portion of this will be grazed by the sheep in 2003. The burned area will be rested from grazing for two growing seasons in compliance with the Forest's Post Burn Grazing Guidelines.

Environmental Effects

Direct and Indirect Effects

Alternative 1 (No Action)

Forage Availability

In Alternative 1, short term effects would be increased forage availability as grasses and forbs would have little competition from shrubs and trees for a number of years. However, over the long-term, forage availability would be decreased as snags fall and material accumulates on the forest floor inhibiting the growth of ground vegetation.

Distribution of Livestock

In the long term (10 –15 years) as a large quantity of snags fall the difficulty in getting proper livestock distribution would increase. There would be decreased distribution of cattle through the units including RHCAs, resulting in an increased possibility of overuse of forage in some areas, and no use in others. As debris accumulates, access to water sources could be impaired which would further disrupt livestock distribution patterns. The lack of application of prescribed fire under the No Action Alternative would directly affect the amount of downed material hindering cattle distribution.

Range Improvements

Under Alternative 1, existing spring developments and fence lines would require more intensive maintenance. As falling snags and accumulating debris will likely cause damage to structures and impede fence rights-of-way and routes to water sources.

Permittee/Range Management Access

Under the No Action Alternative, there would be no closures or decommissioning of roads. This would allow current road access to spring developments, salt grounds and fence lines. The eventual accumulation of fallen debris under the No Action Alternative would result in impediment of horseback riders in moving cattle, as well as Off Highway Vehicles (OHV's)

used to inspect and maintain fence lines and spring developments away from established roads.

In the long-term, as forage becomes less available, the number of permitted livestock or period of use may need to be reduced.

Alternatives 2, 3, and 4

During the recovery period, grazing management techniques to achieve desired use levels would be implemented. This could include adjusting location of livestock turnout, placement of salt blocks or other management practices that would promote use by livestock in those portions of the pasture away from the fire. Specific grazing management adjustments would be developed in coordination with the allotment permittee and incorporated into annual instructions.

Forage Availability

Forage would be more readily available as salvage harvest opens up canopy cover, and reduces the number of snags that will fall and accumulate on the forest floor. Fuels treatment associated with these alternatives would reduce the accumulation of large material on the ground, which would also increase forage availability.

Reforestation would impair forage availability to some extent, as young trees become competition for grasses and forbs. Management of planted trees would at some point include thinning and commercial harvest, which would open up the canopy and allow more ground vegetation growth in the long-term.

Decommissioning of roads under these alternatives would also provide more forage as grasses become established in old roadbeds.

Distribution of Livestock

Harvest and fuel treatment would result in fewer future impediments to travel from large log accumulations on the ground. This would facilitate cattle movement, and thus distribution, over the allotment, resulting in more even utilization of forage resources. The expected reduction in large materials on the ground would allow more open travel ways for livestock to salt and water sources, maintaining livestock distribution patterns in uplands. The RHCA salvage included in Alternative 2 also would reduce impediments to cattle. Alternative 3 and 4 that includes no RHCA salvage would reduce cattle movement to water sources.

A restriction on sheep grazing within the portion of the Spring Creek allotment where within areas of newly regenerating seedlings would exist for a period of 5 to 10 years. Sheep would not be allowed to graze within these planted or natural regenerated areas until the seedling are 3 feet tall. This would be time necessary to allow seedling to grow to average height of 3 feet and would not be susceptible to grazing damage from the sheep.

Closure and decommissioning of roads will affect changes in livestock use patterns. Over time, snags will fall across currently unobstructed roads. This may result in better distribution of cattle, as cattle are encouraged to find new routes and negotiate around downed materials. The animals may be channeled to sources of forage overlooked in the past.

Range Improvements

The reduction in potential for falling snags will lessen the chance of damage to fence lines and spring troughs resulting in standard maintenance rather than the excessive repairs

expected from large numbers of snags. Fuels treatment will likely provide more open access along fence rights-of-way and routes to water sources, to properly utilize these structures.

Permittee/Range Management Access

Closure and decommissioning of roads within the fire area will limit access to some salt grounds, springs and fences which otherwise could be accessed by vehicle. However, horseback or OHV access along fence lines and to salt grounds and spring developments away from roads will be enhanced by the reduction in the quantity of snags and lesser accumulations of large materials on the ground. In general, most permittee or range management work is accomplished by either of these methods, so road closure or decommissioning is not likely to be a hindrance.

Alternatives 5

During the recovery period, grazing management techniques to achieve desired use levels would be implemented. This could include adjusting location of livestock turnout, placement of salt blocks or other management practices that would promote use by livestock in those portions of the pasture away from the fire. Specific grazing management adjustments would be developed in coordination with the allotment permittee and incorporated into the annual instructions.

Forage Availability

Same as Alternative 1.

Distribution of Livestock

Same as Alternative 1.

Range Improvements

Same as Alternative 1.

Permittee/Range Management Access

The effects are similar to Alternatives 2, 3, and 4. Increased closures of roads within the fire area will further limit access to some salt grounds, springs and fences that otherwise could be accessed by vehicle. These access issues would carry the most financial impact to range permittees. However, horseback or OHV access along fence lines and to salt grounds and spring developments away from roads will be enhanced by the reduction in the quantity of snags and lesser accumulations of large materials on the ground.

Cumulative Effects

Common to All Alternatives

The past, ongoing and reasonably foreseeable activities listed at the beginning of Chapter 3 were reviewed for possible cumulative effects. Livestock grazing is restricted on the Wallowa-Whitman portion of the fire. This will further limit grazing lands available to range permittees who rely on National system lands for livestock production.

Common to Alternatives 2,3,4 and 5

The past, ongoing and reasonably foreseeable activities listed at the beginning of Chapter 3 were reviewed for possible cumulative effects. The proposed closure of roads on the Wallowa-Whitman National Forest would further restrict the amount of motor vehicle access available to range permittees in managing their allotments.

Consistency With Direction and Regulations

As previously mentioned, the project will not prevent grazing of the allotments. The effects of the wildfire will require a cessation of grazing for a period to allow recovery of herbaceous vegetation. The project as described will not result in any irreversible or irretrievable effects to the range resource. Thus this project is consistent with guidelines for range set forth in the Forest Plan.

Irreversible/ Irretrievable Effects

The project as described will not result in any irreversible or irretrievable effects to the range resource. Thus this project is consistent with guidelines for range set forth in the Forest Plan.

Economics/Social

Regulatory Framework

The Malheur Forest Plan includes forest-wide management goals to:

- Provide a sustained flow of timber for lumber, fiber, and/or associated wood products at a level that will contribute to economic stability, while providing for regional and national needs.
- Contribute to the social/economic health of communities, which are significantly affected by national forest management.
- Provide an economic return to the public.
- Provide and utilize wood fiber in the form of sawtimber, fiber, and/or associated wood products, while minimizing losses and maximizing outputs in a cost-effective manner, consistent with the various resource objectives and environmental standards.

The Code of Federal Regulations (CFR) is a codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government. Minimum specific management requirements are identified in 36 CFR 219.27, to accomplish goals and objectives for the National Forest System. Those management requirements are addressed as follows.

- Section (b) Vegetative Manipulation: (1) Multiple-use; (3) Not chosen for greatest dollar return; (7) Practical transportation, harvest requirements, and preparation and administration.
- Forest Service policy sets a minimum level of financial analysis for project planning (FSH, 1909.17).
- The National Environmental Policy Act requires integrated use of the natural and social sciences in all planning and decision-making that affects the human environment. The human environment includes the natural and physical environment, and the relationship of people to the environment (40 CFR 1508.14). Forest Service land management planning regulations require the integration of social science knowledge into forest and regional planning processes (36 CFR 219.5).
- Title 40, Code of Federal Regulations for NEPA (40 CFR 1502.23) addresses non-commodity values, stating “For the purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis, and should not be, when there are qualitative considerations.”

- 36 CFR 219.3 – National Forest System Land and Management Planning
- Executive Order 12898 (February 11, 1994) on Environmental Justice directs federal agencies to identify and address agency programs that may have disproportionately high and adverse environmental effects on minority populations, low-income populations, or Indian tribes. The order directs federal agencies to focus attention on the human health and environment effects to ethnic minorities (American Indians, Hispanics, African Americans, and Asian and Pacific-Islander Americans), disabled people, and low-income groups.

Analysis Method

Forest Service Handbook (FSH) 2409.18 provides direction to analyze financial efficiency and, if needed, economic efficiency, to identify the most efficient alternative that achieves the desired objectives of the project. Consideration of the proposal that maximizes net public benefits is an important consideration of the decision-making process.

An economic efficiency analysis was completed. It focused on identifiable and quantifiable ecosystem benefits and costs for each alternative in terms of the present net value (benefits minus costs), to assess which alternative comes nearest to maximizing net public benefits (36 CFR 219).

Ecosystem functions provide a broad set of ecosystem services, such as clean water or native forest stands, which are valuable to both human and nonhuman components of the ecosystem. These ecosystem values may be assessed in economic and noneconomic terms. Economic valuation provides a partial measure of the full range of ecosystem values in commensurate terms for assessing economic tradeoffs. Noneconomic values are necessarily assessed in terms relevant to other disciplines such as ecology or ethics. Changes in ecosystem services must be measurable and quantifiable in like terms, preferably monetary measures, in order to assess a relevant change in economic value (Kohrman 2003).

This analysis is based on identifiable and quantifiable economic benefits and costs, and is more typically a financial comparison between revenues and costs. The objective of the economic efficiency analysis is to show a relative measure of difference between alternatives, based on direct costs and values used. All dollar values have been discounted in terms of the present net value (2003 dollars). Discounting is a process whereby the dollar values of costs and benefits that occur at different time periods are adjusted to a common time period so that they can be compared. The real (exclusive of inflation) discount rate of 4% was used in the analysis over the planning period.

Present net value is defined as the present (discounted) net value of project benefits minus the present (discounted) net value of project costs. A benefit-cost ratio is the ratio of present net benefits to present net costs. Present net value is a more appropriate measure for comparison between alternatives when land and productive activities are limiting, such as in an environmental analysis of alternatives. A benefit-cost ratio comparison is more appropriate when investment capital is limited, for example when considering budget allocation among a number of different activities.

The tentative advertised bid rates estimated for the Monument Fire Recovery Project reflect the most current volume, price, and cost estimates for this analysis. An initial bid rate was determined by subtracting the costs associated with logging from the base period prices adjusted for the quality of the material and current market conditions. This rate was further

reduced by current appraisal methods (Transaction Evidence Appraisal) to allow for competition between bidders, to determine the tentative advertised bid rate. The computer software program, TEA_ECON, was used for this analysis. The results of that analysis are included in the Project File.

Costs for reforestation and other direct work were developed based on previously experienced costs. Costs for temporary roads and road maintenance were included in the Transaction Evidence Appraisal. Reforestation costs were not included in the sale appraisal.

Non-commodity values were not included in this analysis, because these resources are evaluated under the specific resource section (40 CFR 1502.23). Effects on resources are documented in individual resource sections.

Employment and income effects were derived from response coefficients from the input-output model IMPLAN (Impact Analysis for Planning) for the Roadless Social Economical Report for the Malheur National Forest impact zone, and from the forest-level Timber Sale Program Information Reporting System (TSPIRS) analysis in fiscal years 1996 to 1998. Job estimates include temporary, permanent full-time, and part-time employment. The estimates do not include unpaid family workers or sole-proprietors.

Analysis Area

Although individuals and communities over a wide geographic area use national forest resources, the residents and businesses of counties near the forest depend most heavily on the availability of the resources. Consequently, the effects of forest management on social and economic factors are strongest within these areas. For this reason, the Malheur National Forest primary zone of influence is defined as Grant and Harney counties in Oregon.

Affected Environment

A social and economic analysis entitled *Recovery Efforts 2002 Fires – Draft Environmental Impact Statement: Social and Economic Conditions*, has been completed for the fire recovery efforts on the Malheur National Forest (Kohrman, 2003). This document is incorporated by reference under 40 CFR 1502.21. The document presents social and economic affected-environment information for this analysis. It provides information on human uses, social and economic characteristics, and conflicts among various users and uses of the ecosystem. It also discloses: the health of the relationships among the people (community), the forest, and the larger ecosystem; perceptions and values related to ecosystem management; and recent social and economic trends in the economic region. The focus is primarily on, but not limited to, Grant and Harney counties.

Changes in levels of resource use associated with the Monument Fire Recovery Project may affect the major social and economic characteristics of the surrounding geographic area. The affected area or impact zone for the Malheur National Forest consists of Grant and Harney counties in Oregon. Agriculture, manufacturing (particularly wood products), and retail trade are important sources of employment and income in this region. Grant County, for example, has a low level of economic diversity, a high dependence on federal timber and forage, and a low resiliency for change. Reliance on timber and forage from federal lands is moderate to high in counties in the impact zone (Kohrman 2003).

Many communities are closely tied to the forest in both work activities and recreation. The local communities within an hour or two drive that are anticipated to be directly or indirectly

affected by the proposed action, alternatives, and their associated economics include: Prairie City (population 1,080), Burns/Hines (4,565), Dayville (140), John Day/Canyon City (2,740), Long Creek (260), Mount Vernon (650), Monument (150), Seneca (230), Sumpter (175), and Unity (145). Austin, Greenhorn, and Hereford are examples of other smaller communities also located in the vicinity. Larger cities two or more hours away from John Day include: Baker City (10,160), LaGrande (12,795), Ontario (10,680), Bend (52,029), and Pendleton (16,915) (ODOT 2001). The nearest metropolitan areas are the Tri-Cities area of Kennewick, Pasco, and Richland in Washington State, and Boise, Idaho.

Employment

Cattle production and forest products provide the core employment for Grant and Harney counties. Forest products industries include 3 major lumber mills and numerous logging companies. Wood products employment totaled 530 direct jobs (e.g., mill workers and loggers) and 131 indirect jobs, approximately 14% of the total non-farm employment in Grant and Harney counties (average annual in 2000). Local government, retail trade, and services employ the most people in Grant and Harney counties (Kohrman 2003). The area surrounding the Monument Fire Recovery area is rural, and has disproportionately high unemployment compared with the Oregon state average and the National average. Grant County is in its sixth consecutive year of declining non-farm employment, and “this is quite possibly the longest ongoing downturn any local labor market area in Oregon has ever experienced” (Kohrman 2003).

Ranchers in Grant and Harney counties, with federal permits in the analysis area, are highly dependent on forage from federally managed lands, compared to other counties in the region. The value of cattle reared on forage from federally managed lands represents more than 10% of total agricultural sales in Grant and Harney counties (Haynes & Horne, 1997). Baker, Wheeler, and Malheur counties are rated moderately dependent (3.57% to 10% of total agricultural sales comes from cattle raised on forage from federally-managed lands). Union, Umatilla, Morrow, and Gilliam counties are less dependent (less than 3.57%). Shifts in permitted use of federal grazing allotments change the availability of this forage source. The impact these shifts have on the local economy varies according to the adjustments that local ranchers have to make within their ranching operation.

Recreation-based industries, while prevalent elsewhere in the region, have not been a major contributor to the local economies. Recent efforts indicate that the volume of business is only enough to supplement income, rather than provide a primary source of income (Kohrman 2003). The exception is hunting season, which typically draws larger numbers of people into the area. Stores that sell sporting goods benefit during this period. Recreation-based employment is seasonal and service-oriented, with wages at the lower end of the pay scale (Kohrman 2003). Economic activity based on recreation may have limited growth potential for communities in the area (Kline, 2001). Seasonal limitations, the dispersed nature of recreation within the counties, along with a general lack of large, water-based recreational opportunities, does not create the concentrated numbers of recreationists and readily-identifiable recreation destinations necessary to support many recreation industries (Kohrman 2003).

Historically, government employment and expenditures has provided a degree of stability in rural communities (Kohrman 2003). With reduced Forest Service budgets and work force, and a switch to management emphasis that produces generally lower amounts and value of products, federal workforce and program expenditures has not buffered economic downturns

as in the past (Oregon Department of Employment, 2001). This situation, combined with fluctuations in the other base industries, has had a significant effect on the economy (Kohrman 2003).

The communities surrounding the Monument Fire Project Recovery area are considered rural in character, and have a disproportionately high unemployment compared with the Oregon State average of 7.3% and the National average of 5.8%. Unemployment in Baker County for February 2003 was 12.6%, Grant County – 14.6%, Harney County – 13.1% and Malheur County – 11.4%.

Average Wages

Average annual pay per job provides an indication of the quality of jobs in the analysis area. Average income for the affected counties is also below the national and state averages: United States \$36,214, Oregon \$33,202, Baker County \$24,190, Grant County \$24,492, Harney County \$23,308, Malheur County \$23,163 (Kohrman 2003). Wages in Grant and Harney counties are lower, primarily due to lower wage rates per hour and a larger number of part-time jobs, compared to the state as a whole (Kohrman 2003).

Per Capita Income

Per capita income measures economic well being, taking into account both population and income changes, although it does not address income distribution. Per capita personal income is total personal income divided by the estimated population. Per capita income in Grant and Harney counties is approximately \$22,439 and \$22,670 (2003 dollars), respectively. These counties lag behind the statewide average of \$29,347 (2003 dollars).

Human Health and Safety

There are concerns about effects to the human health and safety of people using the project area and roads accessing the area. Another issue raised was the safety concern to workers and the public from hazard trees along roadsides.

Environmental Justice

The population of the area is predominately white, followed by American Indians. The region is sparsely populated, and contains low populations of minorities (5.5% of the Grant County population, 5.4% of Baker County, 9.9% of Harney County, and 31.2% of Malheur County (of which 25.6% is of Hispanic origin with the majority living east of Vale) (Kohrman, 2003; United States Census Bureau 2003). The primary American Indian tribes involved are the Burns Paiute and Umatilla. With the exceptions of the Burns Paiute and Hispanics east of Vale, minorities are scattered throughout the counties.

Poverty rates provide some indication of the percentage of the population in surrounding communities with low-incomes. Poverty rates for both Grant and Harney counties are 13.7%. The Oregon statewide average rate of persons living below poverty is 11.6% (Kohrman 2003).

Data regarding minorities or people with disabilities employed in the region in the timber, mining, ranching, road construction, forestry services, and recreation sectors is unavailable. Some firms contracted by the Forest Service for reforestation work have traditionally hired Hispanic workers that comprise a migratory workforce in the area. Asian and Pacific Islanders uses of the area include commercial mushroom harvesting and developed camping associated with this activity. Some contracts are reserved for award to minority businesses

under the USDA Office of Small and Disadvantaged Business Utilization and the Small Business Administration, although overall contract amounts to these groups has declined since 1998 (Kohrman 2003).

Environmental Effects

The social and economic effects of the various proposed management alternatives were assessed in terms of viability of harvestable timber, employment supported by the alternatives, and the economic efficiency for relative comparison between alternatives.

Timber Harvest

Economic Viability

The area proposed for commercial harvest within the Monument Fire Recovery Project area was analyzed to determine the economic viability of harvesting timber, by determining the tentative advertised bid rates per hundred cubic feet (\$/ccf). The tentative advertised bid rates estimated for the Monument Fire Recovery Project reflect the most current volume, price, and cost estimates for this analysis. All alternatives that harvest timber would produce positive bid rates, indicating that the project would provide a viable harvest proposal. Based on this analysis, Alternative 4 provides the highest tentative advertised bid rate at \$127.14/ccf, and therefore the highest potential revenue from the sale of timber. Alternative 2's bid rate is slightly lower, at \$121.09/ccf, due to a greater amount of advanced logging systems, followed by Alternative 3 with the lowest bid rate of \$104.82/ccf. Alternative 1 and Alternative 5 would not harvest any timber, and therefore would not produce any revenue or benefits to wood products industries. Advertised bid rates have fluctuated over the last few years, reflecting the volatility of the timber market. Changes to prices would likely occur at the time of the appraisal, depending on actual market conditions at that time.

Timber Supply

The 1990 Malheur National Forest Land and Resource Management Plan (LRMP) established an allowable sale quantity (ASQ) for the forest of 38.4 million cubic feet or 211 million board feet (MMBF) average per year. An ASQ is an upper limit for the plan period, not proposals for sale offerings or an assigned target. Actual sale levels depend on factors such as limitations of modeling, changes in law and regulations, changes in social-economic values, listing of threatened and endangered species, changes in budgets, and site-specific conditions. The Regional Forester Eastside Forest Plans Amendment 2 (1995) and by PACFISH and INFISH in 1995, in response to some of these changing factors. Table SE-1 compares the Malheur National Forest's annual offered timber volume with its assigned target timber volume for the fiscal years since the 1990 LRMP went into effect. Accomplishment of timber targets is based on volume offered.

Table ES-1. Malheur National Forest Timber Offer by Fiscal Year 1991 to 2002

| Fiscal Year | Target Volume MMBF | Offered Volume MMBF |
|--------------------|---------------------------|----------------------------|
| 1991 | 229.0 | 201.6 |
| 1992 | 220.0 | 100.8 |
| 1993 | 197.0 | 71.7 |
| 1994 | 101.0 | 33.1 |
| 1995 | 85.0 | 66.9 |
| 1996 | 100.0 | 80.9 |
| 1997 | 110.0 | 38.9 |
| 1998 | 95.0 | 77.1 |
| 1999 | 63.5 | 34.1 |
| 2000 | 45.0 | 17.5 |
| 2001 | 36.7 | 15.4 |
| 2002 | 24.2 | 2.7 |

In response to a request by then Oregon Governor Kitzhaber, the Blue Mountains Demonstration Area published in 2002 an assessment entitled Assessment of Timber Availability from Forest Restoration with the Blue Mountains of Oregon (USDA, 2002). The assessment describes management actions over the past decade, current vegetation conditions where a reliable supply of wood could be available, estimations of the quantity and type of forest timber products that may result from forest restoration actions, and a market analysis for potential timber products and the associated economic impacts on individual communities.

This assessment concludes that 71% of the national forest lands in the Blue Mountains of Oregon were not available for substantial and sustainable harvesting of timber. Only minimal amounts of timber would be harvested during restoration treatments of these lands, and prescribed fire may be the primary tool available to accomplish fuels reduction and thinning. This trend would likely continue because there is no anticipated change in management direction. The assessment further concludes that the remaining 29% of the national forest lands that are available for substantial and sustainable timber harvest (Active Forestry lands) was actively managed over the last three decades. Up to a third of these lands have experienced timber harvest or non-commercial thinning since 1988. Approximately 58% of these Active Forestry lands are currently overstocked; however, nearly half of these overstocked lands are suitable only for non-commercial thinning treatments, yielding only incidental amounts of merchantable timber. This trend is also likely to continue.

Selection of Alternative 1 (No Action Alternative) and Alternative 5 (Restoration) has the potential to continue the decline of timber-related employment in the rural communities of Baker, Grant, Harney, and Malheur counties. Alternatives 2, 3 and 4 would provide some short-term (1 to 2 years) economic relief. Various amounts of large diameter wood (greater than 12 inches diameter at breast height) would be salvaged, rather than the biomass

utilization brought about by just thinning smaller diameter trees. This larger diameter wood is the type of material needed to support the 3 large-diameter saw mills operating in the John Day/Prairie City area. The amount of local economic relief would be determined by whether the purchaser is local or distant, what mill(s) local or distant actually receives the logs, and the price for lumber.

These cumulative economic effects could cause cumulative “quality of life” social effects. Continued loss in timber-related jobs could affect the remaining infrastructure and capacity in the local rural communities, and could disrupt the dependent local goods and services industries. Diversification opportunities for these local rural economies are currently limited, and this trend is expected to continue until economical biomass utilization can be further developed (LeVan, 1998).

Employment

The primary effect on timber harvest-related employment would occur from commercial harvesting associated with the alternatives over the next two years. Financially viable sales would be necessary to provide opportunities for timber harvest-related employment. Levels of harvest volume by alternative would affect employment and income in several ways:

- 1) Direct effects attributable to employment associated with harvesting, logging, and mills and processing plants for sawtimber, pulp, chips, veneer, and plywood
- 2) Indirect effects attributable to industries that supply materials, equipment, and services to these businesses; and
- 3) Induced effects attributable to personal spending by the business owners, employees, and related industries.

No harvest-related activities would occur under Alternative 1 (No Action), and Alternative 5 (Restoration), and therefore no contribution to direct, indirect, or induced employment and income associated with timber harvesting would result from the project. Declining trends in timber harvesting from National Forest System (NFS) lands would continue in the future, and contribute to declines in wood products employment and associated indirect employment over the next two decades. Changes in the economic base and wood products infrastructure for the impact area would also continue to be influenced by fluctuations in market prices, international market conditions, changes in technology, and industry restructuring.

The overall employment and income effect from Alternatives 2, 3 and 4 would continue to support the wood products manufacturing component of the economic base of the impact area. The magnitude of the economic effects would be limited to two years, associated with the harvesting activities. Alternative 2 would support the highest level of employment, at 271 jobs over the two-year period. Alternative 3 is the lowest with 131 jobs, with Alternative 4 supporting 240 jobs. Any individual county or community in the impact area could experience greater benefits in the short-term (2-3 years), particularly the communities highly specialized in wood products manufacturing. However, several factors would influence the ability of any one county or community to experience the largest extent of the harvest-related employment and income effects. The financial viability of the timber sale proposals would influence whether potential purchasers closest to the project area could be competitive with other purchasers, to acquire the majority of the supply of wood. Employment projections would depend on other factors such as market conditions, quality and quantity of the volume offered for sale, timing of the offerings, and financial conditions of local firms.

The distribution of economic impacts would depend on the location of the timber purchaser awarded the contracts at the time of the sale, the availability of equipment and skills in the impact area, and the location and availability of the wood processing facilities and related infrastructure. Given the size of the potential volume compared to offerings in the last year from NFS lands across the Blue Mountains, several mills located in other counties in Northeast Oregon would be potentially interested in the supply of wood offered. Alternatives 2, 3 and 4 require helicopter logging. There are no locally owned, helicopter logging businesses; all locally owned logging businesses use ground-based equipment. Therefore, even if a locally-owned logging business is the purchaser of the proposed timber sales, a portion of the income generated from these sales will leave the local area to a sub-contracting helicopter business. The reverse is also true. If a helicopter logging business purchases the sales, they may hire local loggers to perform a portion of the work. Alternative 2 proportionately would return the least amount of income to local logging businesses, because it requires the most amount of helicopter logging (3,785 acres); Alternative 4 proposes 2,885 acres; and Alternative 3 proposes 2,520 acres. Alternatives 2 proposes 490 acres of ground-based timber harvesting, and Alternative 3 proposes 305 acres, and Alternative 4, 459 acres. Since the majority of the volume in Alternatives 2, 3 and 4 will be helicopter-yarded, companies outside of Northeast Oregon would bid on the helicopter-logging portion of the sale, and distribute the jobs and income effect to other regions of the State.

Annual timber-related employment supported by timber harvested from the Malheur National Forest for the years 1999-01 averaged 388 direct jobs. Annual harvest for these years averaged 39 MMBF. Employment supported by commercial harvesting in Alternative 2 would support approximately 70% toward this level of annual employment. Alternative 4 would support approximately 62%, with Alternative 3 supporting approximately 34% toward this level. Alternatives 1 and 5 would not provide harvest opportunities and would not support employment in the impact zone from timber harvesting.

Other employment would continue to occur as a result of other timber sales in progress, domestic-livestock grazing, recreation activities, and other special use receipts across the Forest. Commercial collection of non-timber forest products, such as mushrooms, could continue to occur, although the quantity of harvest is unknown. In addition, other employment opportunities would also be provided by restoration and enhancement activities outlined for the Monument Fire Recovery Project, and would depend on the level of funded projects.

Economic Efficiency

An economic efficiency analysis was completed. It focused on identifiable and quantifiable ecosystem benefits and costs for each alternative, in terms of the present net value (benefits minus costs), to assess which alternative comes nearest to maximizing net public benefits (36 CFR 219.3).

Measurable and quantifiable economic market benefits identified in the Monument Fire Recovery Project include discounted revenue from timber volume proposed for harvest. Measurable and quantifiable costs at the project level include direct costs to the Forest Service for preparing and administering the commercial timber sales, and implementing other restoration activities including reforestation, decommissioning roads, and rehabilitating skid trails.

Table ES-2. Present Net Benefit, Present Net Costs, and Present Net Value.

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|-------------------------------------|---------------|---------------|---------------|---------------|---------------|
| Present Net Benefits | | 1.34 | 0.66 | 1.27 | |
| Timber Value | \$0 | \$6,806,351 | \$2,746,429 | \$6,117,461 | \$0 |
| Sale preparation and administration | \$0 | \$1,680,915 | \$738,489 | \$1,438,803 | \$0 |
| Restoration and mitigation projects | \$0 | \$3,391,388 | \$3,391,388 | \$3,391,388 | \$2,171,750 |
| Present Net Value | \$0 | \$1,734,048 | -\$1,383,448 | \$1,287,270 | -\$2,171,750 |

Alternative 2 would have the greatest present monetary net value of all of the alternatives, due primarily to the number of acres treated and the combination of logging systems. Alternative 4's present net value would have a slightly lower value, due to the harvest of fewer acres and the same amount of restoration work. Alternative 3 would have a negative present net value due to fewer acres harvested, more volume per acre retained to meet resource needs, and higher logging costs. Costs for sale preparation and administration vary by alternative, based on the amount of timber harvested and acres treated. Alternative 1 would have no project-associated costs for comparison to the action alternatives. Alternative 5 would have costs associated with restoration activities but no timber value to offset these costs therefore producing a negative value of -\$2,171,750. Cost for restoration and mitigation contracts include preparation and contract administration costs.

In addition to use values, existence values otherwise referred to as passive, nonuse, or preservation values may capture important economic value to the public (Kohrman 2003). Although these benefits are important components of the ecosystem services provided to humans, the production relationship between ecosystem functions and ecosystem services (such as changes in recreation visitor days, fishing days, animal unit months, or fish population) is not well defined or measurable at the project level, in terms that provide meaningful comparisons of commensurate dollar values. Potential benefits include improvements to soil productivity, reduced erosion, water quality improvements in temperature, and terrestrial and aquatic habitat improvement. Potential improvements in fish habitat would increase fingerling survival rates, overall fish population levels, and recreational fishing opportunities.

Other potential qualitative economic benefits or costs from the alternatives include changes to the diversity, quality, and quantity of wildlife habitat for both game and non-game terrestrial species. The economic value of big-game hunting would depend on how changes in population levels and spatial distribution of game animals affect either the quality or intensity of the hunting experience. Consequently, the overall level of hunting would change with corresponding economic impacts from hunting-related expenditures. Changes in non-game population levels and diversity would affect wildlife viewing, photography, and other non-consumptive uses of the area.

Other opportunity or externalized costs that would potentially occur include damage to soils from harvest operations in tractor units, resulting in long-term losses in soil productivity and potential timber harvest, losses in wildlife habitat as a result of salvage of large dead trees, or

increases in sedimentation to downstream fish habitat from erosion in the fire area. These costs are not well defined or measurable at the project level in terms that provide comparison of commensurate dollar values.

The rural communities of these Eastern Oregon Counties are highly dependent on firewood for personal home heating. Firewood gathering for home use is already not allowed in the Monument Rock Wilderness, and there are other opportunities for firewood gathering close by, therefore no adverse effects are anticipated.

Human Health and Safety

Health effects are limited in scope and duration. This analysis summarizes the human health and safety effects described in other sections of the DEIS.

Direct and Indirect Effects

Alternative 1 (No Action)

Alternative 1 would not improve road access. Deteriorating conditions of standing fire-killed trees along roads would result in a decline in user safety, without additional analysis and corrective measures. In order to maintain public safety, some roads would be closed to motorized vehicles. Normal road maintenance would continue to be scheduled, but road conditions would continue to decline due to the effects of the fire.

Alternatives 2, 3, and 4

With commercial timber harvest, the level of road use would increase within the project area and accessing the area. Increases in the level of use on roads will potentially increase the number of encounters between heavy equipment for logging and recreational visitors, and increase the likelihood of accidents in the short-term (2-3 years). Reconstruction design standards for width, brushing, and hazard trees would mitigate potential encounters and provide safer access on current roads in the long-term, after the harvesting activities are concluded. Directional signing and public information about logging activities would lessen encounters and increase safety. During helicopter yarding operations, the 1672 road system would be closed to public access. This closure would be necessary, because of safety issues involving logs flown across these roads and the increase in log truck traffic.

Retention of snags in Alternative 2 and 3 could subject workers to an increased exposure to hazards created from working around small clumps of snags as they would be distributed across the harvest units. Workers would be required to work within the vicinity of these trees. Some snags would be lost due to safety and operational needs.

Alternative 4 would reduce the exposure of workers to hazards created from snags in the majority of units. Snags would be distributed in patches located outside the harvest units, thus reducing the need to cut them for safety or operational reasons. In the resiliency treatment and two of the salvage units, 1.5 to 2.5 snags per acre would be designated for retention. The majority of these trees would be selected from recent dead thus reducing the potential of them being hazardous to workers.

Alternative 5

Alternative 5 would not improve road access. Deteriorating conditions of standing fire-killed trees along roads would result in a decline in user safety, without additional analysis and corrective measures. In order to maintain public safety 17.2 miles of roads would be closed

to motorized vehicles and 11.8 miles would be decommissioned and removed from the transportation system. Normal road maintenance would continue to be scheduled but roads would continue to decline due to the effects of the fire. The costs of road maintenance and reconstruction would increase in the future due to further declines in the system.

Cumulative Effects

Because of past, present, and reasonably foreseeable future actions, there are economic and social cumulative effects due to road closures and timber harvest. Due to decreased roads funding for the Malheur National Forest over the past several years, there is a cumulative effect as the Forest continues to reduce road densities in other project areas in order to meet budgetary constraints and other resource needs. The costs of road maintenance and reconstruction would increase in the future, due to further declines in the system. Road closures and decommissionings would probably be considered and implemented in future timber sale areas. Socially, this means the current level of access by roads would decline. Recreation, acquisition of nontimber forest products, and other opportunities dependent on road access, would also decline in areas of the road closure or decommissioning.

Environmental Justice

The analysis focuses on potential effects from the project to minority populations, disabled persons, and low-income groups.

Alternative 1 (No Action)

All current uses of the National Forest System lands would continue, including recreation, harvesting of nontimber forest products, special-use permits, subsistence uses, and spiritual/aesthetic uses. Effects to minority populations, disabled persons, and low-income groups would not be disproportionate with other users of the National Forest System lands.

Alternatives 2, 3, 4 and 5

These alternatives provide a variety of opportunities for potential contracts. The alternatives would have no impact on the contracting process or the USDA Small Business Administration program for reserving contracts for minority groups for tree planting, precommercial thinning, and road restoration. Employment and income would be available to all groups of people, subject to existing laws and regulations for set-asides, contract size, competition factors, skills and equipment, etc. Alternatives 2, 3, and 4 would plant 5,326 acres, while Alternative 5 would plant 2,845 acres.

There is no existing information on how much use the area receives from minority and low-income populations. It is estimated that this area receives limited use because of the road conditions prior to the 2002 wildfire. The anticipated direct and indirect social effects to these populations are primarily due to change of access from road closures and decommissioning proposed in Alternatives 2, 3, 4 and 5. Changes in access, due to decreases in open road miles, would occur over the long-term (10 years) in Alternatives 2, 3, 4 and 5. Open road miles would be decreased by 18.1 miles, and would potentially impact disabled people, or low-income groups that require motorized access to participate in recreational activities such as hunting, dispersed camping, or collection of non-timber forest products. These effects would occur for all users of the project area and would not have a disparate impact on any particular minority group. This change from road to non-road access would have its greatest effect on the young, elderly, and disabled. Those with other forms of off-

road transportation (horses, off-highway vehicles, mountain bicycles, etc.) would be less affected than those without these opportunities.

Opportunities for all groups of people to collect species from disturbed and nondisturbed sites would be maintained by all alternatives, and no disproportionate effect is anticipated to subsets of the general population.

None of the alternatives would have disproportionately high and adverse environmental effects on minority populations, low-income populations, or Indian tribes.

Consistency with Direction and Regulations

The Forest Plan contains several goal statements:

- Provide a sustained flow of timber for lumber, fiber, and/or associated wood products at a level that will contribute to economic stability, while providing for regional and national needs.
- Contribute to the social/economic health of communities, which are significantly affected by national forest management.
- Provide an economic return to the public.
- Provide and utilize wood fiber in the form of sawtimber, fiber, and/or associated wood products while minimizing losses and maximizing outputs in a cost-effective manner, consistent with the various resource objectives and environmental standards.

Otherwise, management objectives and standards for economics are not specifically addressed in the Forest Plan. This analysis attempts to display the effects to economic efficiency for this project. In this regard, all alternatives are consistent with the Forest Plan.

All economic elements are consistent with current regulations.

Roads/Access

Regulatory Framework

A Roads Analysis for the Monument Area was completed in July 2003 consistent with current direction (Monument Fire Recovery Roads Analysis, USDA Forest Service 2003). All roads within the fire boundary or which will be used for the fire recovery project were included in this analysis. The analysis showed that there were roads in the area that should be closed to the public and other roads that should be decommissioned. The reasons suggested for the decommissioning of these roads include: unnecessary for future management purposes, wildlife security, noxious weed spread and reduction of sediment into adjacent streams. The Monument Fire Recovery Project is an opportunity to implement some of those recommendations.

Affected Environment

Most of the Forest Service land is roaded with the majority of the roads being Maintenance Level 1 and 2. All of the roads will need some work done on them to meet maintenance standards. This work will range from simple maintenance to reconstruction as defined on Page 3231 of the Federal Register / Vol. 66, No. 9 / Friday, January 12, 2001 / Notices.

On most roads, the roadway surface is either rutted or has rill erosion, or both, which is caused by water running down the roadway or rutting made by the passage of a vehicle. This causes sedimentation to filter into adjacent streams.

Other maintenance needs range from blading the road to reshaping the surface. Most roads in the project area will need this work done. There are also areas where rock will need to be placed to create a surface that will be resistant to rutting during the wet times of the year. Other maintenance items needed, includes brushing areas where there is vegetation encroaching on the road and seeding those areas where the soil has been disturbed by maintenance activities.

There are approximately 11 miles of road that can be decommissioned after any management activities are concluded. Among the reasons for the decommissioning of these roads are: no longer needed for future management purposes; protect adjacent resources such as streams or aspen stands; reduce sediment into adjacent streams. Approximately 7 miles of the decommissioning would occur on roads that are grown in with sapling and have not been driven in a number of years.

Included in the maintenance requirements for these roads is the following work that can be performed as maintenance in any contracts:

- Blade and shape road including existing drainage dips, grade sags, and waterbars.
- Remove and replace culverts with same size or larger culverts up to 36 inches diameter
- Repair damaged culverts
- Place rock in some existing drainage dips and grade sags
- Place rock in wet areas of road
- Brushing
- Remove hazard trees
- Dust abatement

The following work is classified as maintenance under the definition listed in the Federal Register but will be listed as reconstruction in any contracts that are signed.

- Construct new drainage dips.
- Construct new waterbars.
- Construct new outlet ditches.
- Remove and replace culverts with same size or culverts greater than 36 inches diameter.
- Place geotextile on existing road surface.
- Place fill material in ruts in road.
- Repair or replace existing cattleguards.

Environmental Effects

Alternative 1

Direct and Indirect Effects

The consequences of this alternative would be to leave the road system in the same condition it is in now. There would be no opportunity to close or decommission roads or to improve drainage by installing additional drainage dips, waterbars, or cross ditches. This could result

in sedimentation into streams at the current level or higher and would remain at the same cost to the Federal government to meet road maintenance standards.

Cumulative Effects

As described above, past activities and occurrences have affected roads and access in the analysis area. Past and proposed activities that affect roads and access have been analyzed in direct and indirect effects.

In review of past, ongoing, and foreseeable actions, ongoing and foreseeable maintenance and recreational use could pose cumulative effects. Routine surveys of roads would provide condition and effectiveness information to drive ongoing management and maintenance of roads. Road use by motorized vehicles on the open roads would continue degrade road conditions especially during wet periods since most of the roads are native surfaced. All other ongoing and future actions are not expected to affect roads and access. The cumulative effect of roads and access on other resources is discussed in each resource section of Chapter 3 of the FEIS.

Alternatives 2, 3, and 4

Direct and Indirect Effects

These alternatives recommend the same level of work on the transportation system. Approximately 7.0 miles of road that is currently open to traffic would be closed and approximately 11.8 miles of road would be decommissioned.

The maintenance work which would be done on many of the open roads would include blading to eliminate existing ruts, brushing for safety, maintenance of existing drainage features such as drainage dips, waterbars, and cross ditches, placing rock in areas where it will help to decrease sedimentation into streams, and seeding.

The accomplishment of the closures and maintenance will make the open roads safer to travel, reduce sedimentation, lower the open road densities and the total road densities, and improve fish habitat by closing and/or decommissioning roads in RHCAs.

Cumulative Effects

As described above, past activities and occurrences have affected roads and access in the analysis area. Past and proposed activities that affect roads and access have been analyzed in direct and indirect effects.

In review of past, ongoing, and foreseeable actions, ongoing and foreseeable maintenance and recreational use could pose cumulative effects. Routine surveys of roads would provide condition and effectiveness information to drive ongoing management and maintenance of roads. Road use by motorized vehicles on the open roads would continue degrade road conditions especially during wet periods since most of the roads are native surfaced. All other ongoing and future actions are not expected to affect roads and access. The cumulative effect of roads and access on other resources is discussed in each resource section of Chapter 3 of the FEIS.

Alternative 5

Direct and Indirect Effects

The effects are much the same as described for Alternatives 2, 3, and 4. The difference is that more roads would be closed by gates or dirt berms. This would be approximately 16.2 versus 7.0 miles. This would further reduce recreational use of roads and the reduction in the cost of maintaining open roads.

Cumulative Effects

Same as Alternatives 2, 3, and 4.

Consistency with Direction and Regulations

Alternative 1 would not bring this area any closer to meeting the Standards and Guidelines for road densities, fish habitat, or water quality which are contained in the Malheur Forest Plan. Through implementation of Alternative 2, 3, 4 and 5 the Forest would move closer to meeting those Standards and Guidelines.

Inventoried Roadless Areas and Unroaded Areas

The project area is not within any inventoried roadless areas. (See maps contained in Forest Service Roadless Area Conservation, FEIS, Volume 2, 11/2000, page 149 and Monument Recovery Project, Project Scale Roads Analysis, 7/1/2003). No road construction/reconstruction or timber harvest would occur in any of the alternatives in inventoried roadless areas. This meets the requirements of the Roadless Area Conservation Final Rule, 36 CFR 294.

Low Road Density Areas (Unroaded Areas)

The project meets low road density recommendations identified in the Density Analysis Team Final Report (01/30/2002). The project does not contain that meet the unroaded 1,000 acre areas standards in the report. An analysis was completed using the protocols established in Final Report, Land Management Recommendations Related to the Value of Low Road Density Areas in the Conservation of Listed Salmon, Steelhead, and Bull Trout. (Appendix D, pg 37 -41). The two maps created are located in the Monument Project File.

Irreversible/ Irretrievable Effects

Alternative 2, 3, and 4 if implemented, use rock on roads for spot rocking. This would be an irreversible commitment of rock (considered to be a resource). This rock would come from the three rock sources identified in figure 10, Map Section.

There would be a short-term loss of productivity where temporary roads are proposed in Alternatives 2, 3, and 4. But those areas would be returned to productivity when the roads are rehabilitated.

Other Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ...other environmental review laws and executive orders.”

The laws and regulations listed in Chapter 1, Laws and Regulations, would be adhered to. Disclosures are addressed in the environmental consequences discussion by resource. The following is a discussion of issues relating to the Beschta Report (1995).

Issues Relating to the Beschta Report (1995)

The interdisciplinary team (ID Team) considered resource concerns raised by the public, including the Beschta Report. The ID Team considered concerns in the context of the post-fire conditions of the Monument Fire Recovery Project area, and the goals and objectives of the Forest Plan, while consulting the scientific literature on post-fire logging. Scientific literature and monitoring reports are cited throughout this DEIS. The ID Team used McIver and Starr (2000). McIver and Starr reviewed and discussed the existing body of scientific literature on logging following wildfire. Specifically, 21 post-fire logging studies were reviewed and interpreted. McIver and Starr also include an annotated bibliography providing discussion of references, commentaries, and scientific papers pertaining to post-fire logging studies by a wide range of scientific and advocacy sources including the Beschta Report; Everett (1995) (regarding review of the Beschta Report); Saab and Dudley (1997) (regarding responses by cavity-nesting birds to high intensity wildfire and post-fire salvage logging); Sallabanks (1998) (regarding response of breeding bird communities to wildfire in the Oregon Blue Mountains); Sexton (1994) (regarding ecological effects of post-fire salvage logging on vegetation diversity, biomass and growth); and 124 other sources.

Authors of the Beschta Report, who are mostly scientists, provided their opinions on issues of salvage logging in the form of general principles and recommendations. The authors present their suggested policy principles and land management recommendations as generally applicable to Federal lands throughout the western United States, or at least the Interior Columbia and Upper Missouri Basins. They are not focused on the specific ecological, social, and economic characteristics of the post-fire conditions of the Monument Fire Recovery area or the Malheur National Forest.

A major concern with the Beschta Report is that the authors ask land managers to consider all post-fire hazards and management alternatives, but their recommendations usually favor only custodial management (hands off). The report is centered on the “common thread” that natural patterns and processes provide the best pathway to recovery. Limiting post-fire management action to only intensive management or only to custodial management may be inappropriate; every situation is different and should be handled on a case-by-case basis (Everett 1995). Alternatives 1 came closest to meeting the Beschta Report recommendations to allow natural processes to provide the pathway to recovery followed closely by Alternative 3.

The significant issues raised in the Beschta Report and their applicability to the Monument Fire Recovery Project are addressed below, with quotes from the Beschta Report presented in bold italicized font to distinguish them from responses. Further documentation of the site-specific consideration of resource topics raised in the Beschta Report is contained in Chapters 2 and 3.

Findings and Recommendations

Ongoing human activity and the residual effect of past activity continue to threaten watershed ecosystem integrity. The region's ecosystems, not just forests, are under severe strain.

Ongoing human activity and the residual effect of past activity do continue to threaten watershed ecosystem integrity and will likely continue to do so in the future. As revealed during the Interior Columbia Basin Ecosystem Management Project, many of these activities that pose the greatest threats to watershed integrity occur on private lands and are the result of permanent settlement, construction of cities, towns, industrial areas, and various agricultural practices beyond the control of the Federal land management agencies.

The proposed project contains actions aimed at recovery of certain ecosystem process and it contains design criteria and mitigations aimed at minimizing further disruption of ecosystem processes. Examples of actions aimed at recovery include fuels control by logging, conifer planting, restoration of old skid, and include road decommissioning. Chapter 3 discloses that there would be short-term impacts and risks associated with some activities in order to realize long-term improvements. Projects planned under Categorical Exclusions (Chapter 1) also would help decrease threats from residual effects of past activity.

Fires are an inherent part of the disturbance and recovery patterns to which native species have adapted.

If fuels are not effectively reduced, the severity of future wildfires will not be part of the disturbance and recovery patterns to which native species have adapted. Lightning caused fire and Native American burning has had a significant influence on plant community structure and species compositions and fire regimes. Lightning causes more than 50% of the fire starts in the watershed; the rest are human. Species present in this area were adapted to primarily low intensity, frequent fire as part of the disturbance regime. However around 1900, fire exclusion, selective logging of high value trees, and livestock began dramatic changes, especially in Hot Dry and Warm Dry forests. Grasses were grazed by livestock, reducing fine fuels and making fire suppression more effective. Selective logging removed many of the larger, fire-resistant ponderosa pine. The result is that stands are much denser than historically and an understory of shade tolerant species such as Douglas-fir and grand fir has developed in many areas. These species are not well adapted to the type of fire they may experience today, especially where frequent, low-severity fire has been replaced by infrequent, high-severity fire. The smaller trees serve as ladder fuels that provide a pathway for ground fires to travel into the tree canopy. Once in the canopy, the trees crowns are close enough together for the crown fire to travel long distances causing widespread mortality, as occurred in Monument Fire. In these ecosystems, wildfire no longer operates within historical ranges of variability (Agee 1994), and their effects may be foreign to ecosystem function (Everett 1995).

This issue is also discussed in the responses immediately below.

There is no ecological need for immediate intervention on the post-fire landscape.

Chapter 1 says Purposes and Needs include reducing future fuel loading and re-establishing upland vegetation. These are two long term ecological needs that would not be met without immediate intervention. Objectives include reforesting the burned

area (planting would accelerate reforestation), and fuel reduction (which would protect the trees). A need exists to reduce future fire hazard so that natural and prescribed fire can be used to maintain stands and fuels in more natural and resilient conditions.

Chapter 1 also says the purposes and needs include reducing the effects of roads on wildlife and water quality. This project would reduce sedimentation in streams from existing roads and from interactions between roads and post-fire runoff. In addition there are needs to treat sediment sources and streams to rehabilitate past disturbance. These needs are addressed in this DEIS.

The majority of the planning area is General Forest Management Area where the primary goal is timber production on a sustained yield basis. There is a valid economic objective to provide timber for production of wood products and to contribute to the economy of the local communities.

Existing condition should not be used as “baseline” or “desired” conditions upon which to base management objectives.

The Monument Fire Recovery Project does not adopt pre-fire conditions as Desired Conditions (Chapter 1). Desired Conditions come from the Forest Plan (including “Regional Forester’s Eastside Forest Plans Amendment #2” (1995) and INFISH) to help determine what actions may be appropriate. Desired Conditions describe what environmental, social, or commodity goods and services are wanted from a particular land management area. Generally, baseline conditions (historical conditions) are conditions present before Euro-American settlement, and are often described in terms of Historical Range of Variation.

Fire suppression throughout forest ecosystems should not automatically be a management goal of the highest priority. The overall management goal must be to preserve (and reestablish) the fire and other disturbance regimes that maintain ecological systems and processes, while protecting human life and property.

Fire suppression is not a management goal. Fire suppression is used to meet land management objectives related to protection of life, property, and resources (Evers 2003). The Malheur Forest Plan provides direction to initiate initial suppression action that provides for the most reasonable probability of minimizing fire suppression costs and resource damage, consistent with probable fire behavior, resource impacts, safety, and smoke management considerations. Additional direction is to identify, develop, and maintain fuel profiles that contribute to the most cost efficient fire protection program consistent with management direction (Chapter IV-4). Forest standards are described in the Forest Plan. General fire suppression recommendations are not within the decision space for Monument Fire Recovery DEIS.

Purposes and Need statement in Chapter 1 clearly indicates the goal to re-establish fire to maintain the ecosystem. Purpose for activity “Reduce levels of dead standing and down fuel in upland and riparian areas, to reduce the potential for future high-severity fires and restore a low-intensity/frequent fire regime.” When the Desired Conditions are achieved, less fire suppression probably would be needed to protect life, property, and resources.

Recommended Post-Fire Principles

Allow natural recovery and recognize the temporal scales involved with ecosystem evolution. Human intervention should not be permitted unless and until it is determined that natural recovery processes are not occurring. Preserve capabilities of species to naturally regenerate. Do not take actions that impede natural recovery of disturbed systems. Active reseeding and replanting should be conducted only under limited conditions; such practices should be employed only where there are several years of evidence that natural regeneration is not occurring.

Monument Fire severity was outside the historical range of variability, because fuel loads and connectivity were higher than under natural conditions, resulting in higher tree mortality and higher future fuel loads than under natural conditions. Relying on only natural recovery processes would substantially delay recovery, as described in Chapter 3.

Salvage logging is not expected to have an effect on the developmental pathway of the vegetation (Chapter 3). Reduction in shade on seedlings from salvage operations will not affect seedling survival in the plant associations present in the Monument Fire Recovery planning area. Successful regeneration of previous regeneration cutting in the immediate vicinity of the fire attests to this fact.

Reforestation of burned areas is not required within 5 years by NFMA, but Congress has long emphasized restocking of deforested National Forests. Thus the Forest Service has established a policy that salvaged areas are to be reforested within 5 years also. Where no salvage is done, deforested lands should be reforested as quickly as possible. (Nov. 19, 2002, Regional Forester Letter).

Local experience indicates that delaying reforestation activities will make the regeneration of early seral conifer species such as ponderosa pine increasingly difficult because of vegetative competition and animal damage that is low immediately after a fire and increases over the next 3-5 years (Chapter 3). If natural reforestation failed, it could require the use of chemicals (rodenticides and herbicides) to establish conifer seedlings because of the potential vegetative animal damage.

Tree species used in conifer planting are all native species collected from locally-adapted seed sources. By planting as soon as possible, there is no anticipated need for control of competing vegetation or animal damage control. This avoids use of chemicals to achieve reforestation goals.

A non-native, non-persistent, grass seed mix would be used to establish ground cover in certain specific situations. Seeding will be used to prevent erosion on soil exposed during road work, on landings, and on certain skidtrails. Seeding will also be used to prevent colonization by noxious weeds and other undesirable plants on certain disturbed sites. Non-native seed would be used because there is no locally collected seed available for this area. Areas that are seeded with this mix will be monitored verify the amount of time these grasses persist.

Under all alternatives cattle grazing would be deferred in burned portions of allotments for at least two growing seasons, to allow natural recovery of plants. This would be accomplished under a Malheur National Forest post fire interim guidelines.

Noxious weed prevention strategies to wash vehicles to be used off-road are included in the alternatives (Chapter 2).

Protect soils. No management activity should be undertaken which does not protect soil integrity.

This is Forest Service policy. Forest Service Manual 2500, Region 6 Supplement to Chapter 2520, Watershed Protection and Management (2500.98-1) provides policy to meet direction in the “National Forest Management Act” of 1976 (NFMA) and other legal mandates, to manage lands without permanent impairment of land productivity and to maintain or improve soil and water quality. Forest Plan Standards meet NFMA and other legal and regulatory requirements to protect soil integrity.

Site-specific soil assessments and analysis were completed for Monument Fire Recovery Project. Information regarding soil conditions and effects of the alternatives are described in Chapter 3.

The Monument Fire Recovery alternatives contain design and mitigation measures to protect soil integrity. The timber harvest activities will not permanently impair the productivity of the land or irreversibly damage soil or other watershed conditions.

Recommendations on Post-Fire Practices

Salvage logging should be prohibited in sensitive areas including: severely burned areas, erosive sites, fragile soils, roadless areas, riparian areas, steep slopes or any site where accelerated erosion is possible. Because of soil compaction and erosion concerns, conventional types of ground-based yarding systems should be generally prohibited.

As explained in the response immediately above, federal laws, regulations, and the Forest Plan provide authoritative direction to ensure that management activities on these sites do not result in unacceptable impacts to soil and water resources.

Harvest and yarding of trees could lead to increased erosion, soil compaction, and loss of down wood and soil fauna. However, the extent to which these effects occur depends upon a variety of factors such as specific site conditions, the methods used, the timing of these activities, and their duration.

As evidence in Chapter 3 indicates, all alternatives meet Forest Plan Standards for detrimental soil impacts, including compaction. Under harvest alternatives (2,3 and 4) erosion and sediment delivery to streams would be negligible. Under Alternatives 1, there would be no risk of erosion or sediment production from harvest. The alternatives are designed to avoid or mitigate potential impacts of salvage harvest on severely burned areas and erosive sites (including steep slopes), so that impacts are small and acceptable (Chapters 2 and 3). For instance, helicopter yarding systems will be utilized on steeper slopes or those with a high erosion potential. No harvest is planned for the most fragile, non-forested soils.

No inventoried roadless areas or low density roaded areas exist within the project area.

Timber harvest activities would occur in default RHCAs under Alternative 2. Helicopter yarding is proposed to reduce impacts.

On portions of the post-fire landscape determined to be suitable for salvage logging, limitations aimed at maintaining species and natural recovery processes should apply.

Salvage logging must: leave at least 50 percent of standing dead trees in each diameter class, leave all trees greater than 20 inches DBH or older than 150 years, generally leave all live trees.

The Beschta Report provides no rationale or references for these specific quantitative recommendations. “Regional Forester’s Eastside Forest Plans Amendment #2” (1995) directs that snags shall be maintained at 100 percent potential population levels of primary cavity excavators. Malheur National Forest determined prescriptive levels based on this direction as well as post-fire snag use levels summarized in the DecAID analysis tool (Mellen, 2003). Prescriptions have been fine-tuned to address physical and biological conditions in Monument Fire. A range of snag prescriptions have been analyzed in Chapter 3 of the DEIS.

The wildlife habitat value of snags and down woody debris, and the effects of alternatives on snag habitat and down-wood-dependant species are addressed in Chapter 3. All trees that have a reasonable chance of surviving will be retained within the salvage treatment areas (except trees in areas such as landings, trees that pose a hazard to logging operations, or trees that must be felled for road work).

Leaving all big trees would result in a loss of economic viability for salvage operations, loss of the commercial forest product value and associated benefits to the local economy, thus conflicting with some of the Purposes and Needs (Chapter 1), and the objectives for Management Areas 1.

The current fire hazard is low, but by retaining standing dead trees at the levels recommended by the Beschta Report the hazard will increase over the next 10 to 20 years as the snags decay and fall down. A very receptive fuelbed would be created as trees and brush grow through the fallen snags. This fuelbed would prevent the re-introduction of prescribed fire. If a wildfire occurs, it would likely produce intense heat close to the ground, killing any trees (large or small) and could result in damaged soils.

Because of the wide range of chronic ecological effects associated with road building, the building of new roads in the burned landscape should be prohibited.

Road construction would be kept to a minimum. Roads would not be built within RHCAs.

Under Alternative 2 and 3, 0.6 miles of temporary would be constructed and under Alternative 4, 0.4 miles of temporary road would be constructed. While some local impacts to soils would occur, these roads are located in upland areas and would be rehabilitated and decommissioned at completion of harvest activities. No permanent roads would be constructed.

Structural (check dams, etc.) post-fire restoration is generally to be discouraged. Sediment management should focus on reducing or eliminating anthropogenic sources prior to their initiation (that is, improve stream crossings to prevent culvert failure), and protecting and maintaining natural sediment control mechanisms in burned landscapes, particularly the natural recruitment of large woody debris on hillslopes and in streams.

No check dams or other structures are proposed for streams

Numerous roads within the analysis area have been identified as having minimal cross drainage with sediment routed to the streams in numerous locations. Maintenance/restoration of roads that are contributing to erosion and sediment

concerns are identified in the alternatives. No harvest activities will occur within RHCAs in Alternatives 1, 3, and 4, and any hazard trees felled within RHCAs would remain there under all alternatives. Natural recruitment of large woody debris to channels and draws is anticipated as the fire affected trees die and fall into the active stream channels.

The ground cover and sediment control provided by natural recruitment of large woody debris on hillslopes is minor, compared with re-growth of ground plants and shedding of needles and small woody debris by burned trees.

Post-fire management will generally require reassessment of existing management—for example the condition of the transportation system (determine the need for undertaking road maintenance, improvement, or obliteration).

As part of the analysis for this project, a Roads Analysis was completed and is documented in the project file. The ID Team focused on identifying roads or portions thereof, within the existing road system, where resource damage is occurring or is likely to occur based upon the post-fire conditions in the planning area. Roads were recommended for maintenance/restoration and decommissioning. The results of the assessment of the transportation system condition led to the proposed actions related to the road system (Chapter 2).

Continued research efforts are needed to help address ecological and operation issues.

Monument Fire is currently the focus of research this summer by two USDA Forest Service groups, Rocky Mountain Research Station, Moscow, Idaho and Pest Management Group, LaGrande, Oregon in cooperation with Oregon State University.

Considerable other research has begun regarding fire ecology, fire effects, fire risks, fire recovery, and restoration as part of the Joint Fire Science Program and the “National Fire Plan.”

Additional information must be provided to the public regarding natural fires and post-burn landscapes to provide balance to the “Smokey Bear” perspective of fires and forests.

Although designing a public information program is outside the scope of this project, the FEIS contains abundant information regarding natural fires, fuels, vegetation, wildlife, and streams in this landscape. The Forest Service has increased appreciation and understanding of natural disturbance regimes in the ecology of forest ecosystems as evidenced by the “National Fire Plan”. Land management agencies have made much progress in sharing information with the public on fires role in the ecosystem. Evers (2003) states that public information and education campaigns on the benefits of fire and fire ecology had begun before 1995.

Fire suppression activities should be conducted only when absolutely necessary and with utmost care for the long-term integrity of the ecosystem and the protection of natural recovery processes.

This recommendation is beyond the scope of this analysis. National fire management policies direct suppression activities. Current policy is to suppress fires that threaten natural resources and human life and property; these types of fires have become more common because current forest conditions differ greatly from historical conditions, resulting in increased fire sizes and severity. Fire suppression activities are implemented with consideration for ecosystem protection, among other factors. For instance, operating procedures were already in place before 1995 to protect smaller

bodies of water from excessive removal of water and riparian areas from damage to suppression activities (Evers 2003).

Unroaded

Introduction

Agency direction is to consider unroaded areas greater than 1,000 acres if they are contiguous to an inventoried roadless area. Monument Fire Recovery Project area is contiguous to a large unroaded area, the Monument Rock Wilderness. A GIS analysis by the IDT team identified two unroaded areas contiguous to the wilderness, 237 acres and 108 acres. There were other unroaded areas not contiguous to the wilderness, the largest being 485 acres. This analysis was based on the protocols contained the Low Density Road Analysis Report (See Chapter 3, Roads). These protocol standards buffer the roads by ¼ mile and identify any remaining polygons greater than 1,000 acres.

However, the Oregon Natural Resources Council (ONRC) comment letters identified three large “Uninv Roadless” or unroaded areas within or adjacent the project area that approach 1,000 acres in size. Other smaller mapped areas on the west side the project area were less than 200 acres were also identified. These areas identified by ONRC were digitized using their map and overlaid on the District GIS mapping. The areas identified by ONRC are mapped directly adjacent to existing roads. The following acreage calculations were generated directly from ONRC’s map and not adjusted to meet agency direction.

Area 1 is approximately 1,000 acres (west of Camp Creek and adjacent the wilderness), Area 2 is approximately 1,400 acres (east of Camp Creek between a number of roads), and Area #3 is approximately 1,000 acres (south of the Little Malheur River).

Area #1 includes a number of system roads on the interior of the 1,000-acre polygon that reduces this unroaded area by half; it was not considered in the following analysis. The following analysis does consider ONRC Unroaded Area 2 and Unroaded Area 3. Neither unroaded Area 2 or 3 is contiguous to the Monument Rock Wilderness Area or any other inventoried roadless areas.

Regulatory Framework

- National Forest System Land Resource Management Planning; Final Rule (November 2000)
- Malheur Forest Plan

Analysis Methods

The IDT evaluated Areas 2 and Areas 3 for consistency with the nine roadless characteristics defined in 36 CFR 294.11.

Results

Characteristic 1 – High quality or undisturbed soil, water, and air.

Area 2: Area 2 has been impacted by past timber harvest activities. The earliest sale, Canteen Camp, occurred in 1967 and covered about 875 acres of Area 2. The majority of this sale was logged with tractors that has resulted in long term impacts to soil and water resources in the area (Soils and Aquatics sections in Chapter 3). In 1984, the southern end of Area 2 was again logged under the Camp Creek sale. This sale was also logged using tractors and covered about 303 acres of Area 2.

| Timber Sale Name | Harvest Date | Harvest Type | Harvest Method | Acres |
|------------------|--------------|-----------------|----------------|-------|
| Canteen Camp | 1967 | Partial Removal | Tractor, Cable | 875 |
| Camp Creek | 1984 | Partial Removal | Tractor | 303 |

As described in the affected environment of the Aquatics section of the FEIS, most of the draws draining this area are disturbed from past skidding activities that resulted in gullying. Under pre-fire conditions, these draws were sources of sediment and concentrated flows that affected Camp Creek and the Little Malheur River. Activities proposed under this FEIS are expected to initiate restoration of these legacy conditions. Under the current conditions watershed function is not typical of pristine, wilderness-like conditions associated with unroaded areas.

The headwaters of one Category 2 stream are present in the northern portion of Area 2. We do not have water temperature data available to determine the importance of this stream in providing cool water to Camp Creek. No other live streams are present in Area 2.

About half of the Area 2 was burned severely during the Monument Fire. The majority of the remaining portion of Area 2 burned moderately. Soil erosion resulting from the 2002 fire has been severe in areas with the Clarno soil type. This soil type predominates in the southern half of Area 2.

Area 3: The majority of Area 3 is a designated old growth area. About 28 acres of the Bug Butte timber sale occurred along the northern boundary of Area 3 adjacent to the Little Malheur River. An old skid trail from this sale is still visible along the south side of the Little Malheur River. About 44 acres of the Awake timber sale occurred along the southern portion of Area 3.

| Timber Sale Name | Harvest Date | Harvest Type | Harvest Method | Acres |
|------------------|--------------|---------------------|----------------|-------|
| Bug Butte | 1977 | Partial Removal | Tractor | 28 |
| Awake | 1998 | Commercial Thinning | Tractor | 44 |

About three miles of the Little Malheur River are present in Area 3. The Little Malheur River is currently on the 303(d) for exceeding ODEQ standards for water temperatures. No other live streams are present in Area 3.

The majority of Area 3 was severely burned during the Monument Fire. Soil erosion resulting from the 2002 fire has occurred but has been relatively minor compared to Area 2. This is because the ash soil type in Area 3.

Conclusions: Area 2 does not exhibit high quality or undisturbed soil. Impacts to soil from past timber harvest activities are evident and have been exacerbated by the 2002 fire. We do not have the data available to determine if the Category 2 stream in the northern portion of Area 2 can be considered as a high quality water resource.

Before the 2002 fire, Area 3 exhibited high quality and relatively undisturbed soil conditions. Minor amounts of soil disturbance occurred during timber harvest activities. Increases in soil erosion resulting from the fire have been minor and will likely dissipate in three to five years following the fire.

Area 3 does not exhibit high quality or undisturbed water resources. The portion of the Little Malheur River that flows through Area 3 is currently on the 303(d) list for exceeding state

water quality standards. Based on the historical presence of bull trout in this section of the river, management activities in the upper Little Malheur River subwatershed have likely resulted in increases in water temperature.

Characteristic 2 – Sources of public drinking water.

There are no sources of drinking water located in either Area 2 or Area 3.

Characteristic 3 – Diversity of plant and animal communities.

Area 2: Area 2 was surveyed for plant species listed on the Regional Foresters' Sensitive Plant List. Neither habitat nor sensitive plants were found in the area.

A mosaic of open timber stands, and non-forested open areas characterized Area 2 before the 2002 fire. Denser forested stands were present in the northern portion of the area. About half of the Area 2, primarily the southern half, was burned severely during the Monument Fire. The majority of the remaining portion of Area 2 burned moderately. Tree mortality was nearly 100 percent in severely and moderately burned areas in Area 2.

The denser forested stands that existed prior to the fire in the northern portion would have provided for more diverse species than the open timber stands and non-forested areas. Because the area was burned at a moderate to severe fire intensity, forested habitat was eliminated for species that existed prior to the fire. The area now would be considered habitat for woodpeckers such as black-backed, Lewis', and three-toed that prefer habitat with many smaller diameter snags.

Area 3: Area 3 was surveyed for plant species listed on the Regional Foresters' Sensitive Plant List. Neither habitat nor sensitive plants were found in the area.

Area 3 was characterized by a dense mixed conifer stand before the 2002 fire. This area burned severely and tree mortality was nearly 100 percent.

Based on the old growth habitat type that existed prior to the fire, there was value for interior forest species such as pine marten, pileated woodpeckers, and goshawk. Because the area burned at a moderate to severe fire intensity, forested habitat was eliminated for species that existed prior to the fire. The area now provides snag habitat in a range of diameters and may be foraging habitat for many woodpeckers, including black-backed, Lewis', three-toed pileated, and white-headed. There is a goshawk near nearby, but it is unknown if the nest is still active. Because of the likely presence of many woodpeckers in the area, and small rodents in the moderately burned portions, it could also be foraging habitat for goshawks. Nesting habitat for interior forest species no longer exists.

There is a small portion in the interior of this area that is farther than 500 meters from an open road. Prior to the fire, deer or elk may have used the interior of the area more than other areas because of the cover value and the distance from an open road. Because sight distance increased and cover is now reduced or eliminated, the area would not provide for the security for big game. Use by big game may be more for its forage value, as new ground vegetation develops.

Characteristic 4 – Habitat for threatened, endangered, proposed, candidate, and sensitive species (TES) and for those species dependent on large, undisturbed areas of land.

Terrestrial Species

Habitat for TES terrestrial animals was very limited in the project area, even prior to the Monument Fire, due to past management activities in forestlands and limited non-forested habitats (see Wildlife Biological Evaluation in Appendix D). Both unroaded areas are entirely within the project area; therefore, disclosures for TES species are as described in the Wildlife Biological Evaluation.

The unroaded areas, as mapped, do not reflect the influence of the perimeter roads; if road influences are considered, the size of the undisturbed areas of land is reduced. For example, Chapter 3, Terrestrial Wildlife, Big Game Habitat, describes the effects of open roads on elk use; roads that averaged as little as one vehicle per 12-hour period were affecting habitat selection out to 1,000 meters or more (Rowland et al. 2001 and Wisdom et al. 1998). Much of Areas 2 and 3 are within 1,000 meters of an open road, reducing their effectiveness as elk habitat. Disturbance effects vary by wildlife species, and road influences may or may not extend to the same distance as suggested for elk.

In the short-term, the Monument Fire, particularly where it burned with moderate to severe intensity, has further reduced the likelihood of wildlife species dependent on large, contiguous blocks of forest from using these areas. Species such as wolverine might use these areas for dispersal or foraging; however, given the size of these areas, the influence of roads, and the severity of the burn, it is unlikely that use levels would vary substantially from adjacent areas.

Aquatic Species

Area 2: Habitat for Columbia spotted frogs may be present in the three springs located in Area 2. No other habitat for threatened, endangered, proposed, candidate, and sensitive aquatic species is present in Area 2.

Area 3: About 3 miles of the Little Malheur River are in Area 3. The Little Malheur River provides habitat for three Region 6 sensitive aquatic species: redband trout, Malheur mottled sculpin, and Columbia spotted frog. Proposed critical habitat for bull trout is also present in this reach of the Little Malheur River.

Rare Plants

Threatened or endangered plant species or their habitats are not present on the Malheur National Forest (which includes the unroaded areas identified). Surveys did not find sensitive plant species within these unroaded portions of the Monument Fire (see Characteristic 3).

Characteristic 5 – Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation.

Area 2 and Area 3 are managed as roaded modified and roaded natural.

Characteristic 6 – Reference landscape.

Area 2: The forested and non-forested areas in Area 2 have been sufficiently altered that they no longer provide a reference landscape. The most noticeable impacts are from timber harvest and livestock grazing.

Area 3: Before the 2002 fire, Area 3 provided an old growth reference landscape. However, like the majority of old growth stands on the southern portion of the District, this stand had been altered because of fire suppression activities. This likely resulted in an increase in fire

severity during the 2002 fire and higher mortality compared to what would have been expected for an unaltered old growth stand.

Characteristic 7 – Natural appearing landscapes with high scenic quality.

Area 2: Area 2 is outside the Table Visual Corridor. Before the Monument Fire, evidence of past timber harvest activities was present in Area 2. Old skid trails and stumps were readily visible over much of the area. The amount of classified and unclassified roads, skid trails and stumps within Area 2 combined with the increased visibility of the landscape through the loss of live trees gives the viewer the same effects to landscape aesthetics as adjacent burned areas not identified by ONRC as unroaded areas. This area does not have the pristine, wilderness-like appearance associated with unroaded areas.

Area 3: Area 3 is outside the Table Visual Corridor. Most of the large diameter trees that were present in Area 3, especially in the Designated Old Growth Area, were killed by the 2002 fire. Although evidence from past timber harvest activities was not readily apparent in Area 3, the increased visibility of the landscape through the loss of live trees gives the viewer the same effects to landscape aesthetics as adjacent burned areas not identified by ONRC as unroaded areas. This area does not have the pristine, wilderness-like appearance associated with unroaded areas.

Characteristic 8 – Traditional cultural properties and sacred sites.

Traditional cultural properties or sacred sites are not present in Area 2 or Area 3 (see FEIS, Chapter 3, Cultural Resources Section).

Characteristic 9 – Other locally identified unique characteristics.

Locally identified unique characteristics are not present in Area 2 or Area 3.

Conclusions

Based on the 9 characteristics of roadless areas, neither Area 2 nor Area 3 in their current condition is considered to have value for consideration as roadless areas. This document will continue to analyze these areas as their existing land classification.

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